AUGUST
1960

Industrial Refrigeration

In This Issue—
Some solid ideas on how to diversify the refrigerated warehouse business.
See page 10.

COVER—A power house, serving a research lab is large enough to serve a small town with electricity and air conditioning.
See page 9.

Another SPORLAN FAMOUS FIRST!

The LEVEL-MASTER CONTROL . . . 1951

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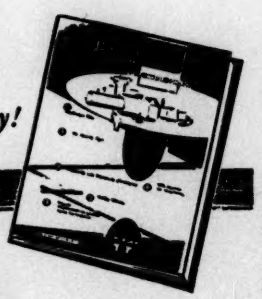

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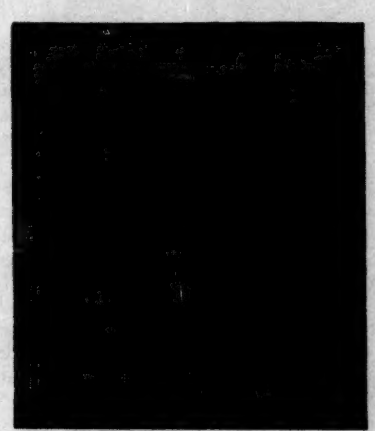

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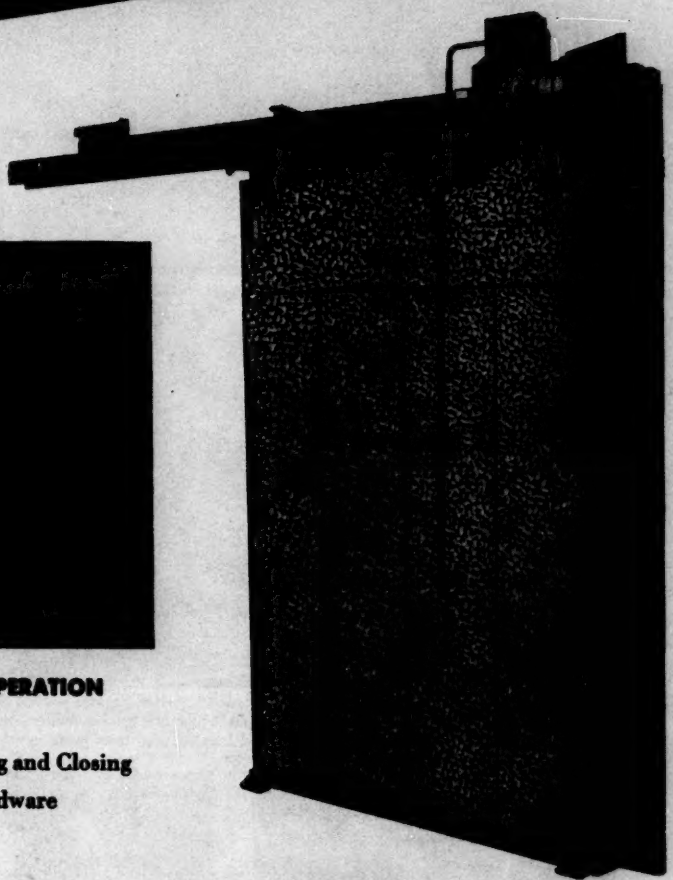

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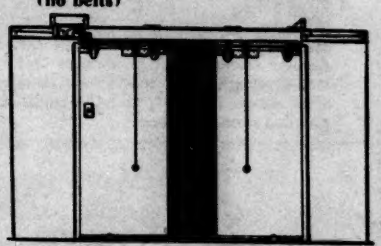

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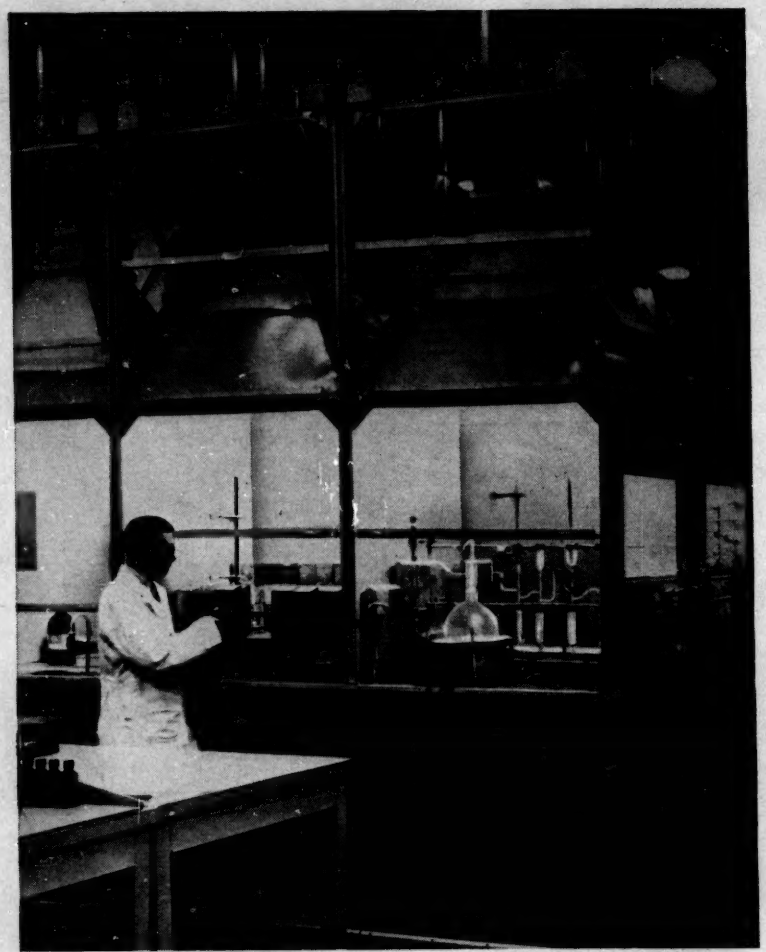

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Summer reading soars in libraries that install air-conditioning. Scholars and browsers alike escape the heat, and the books are guarded from dampness.

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Industrial Refrigeration

August 1960

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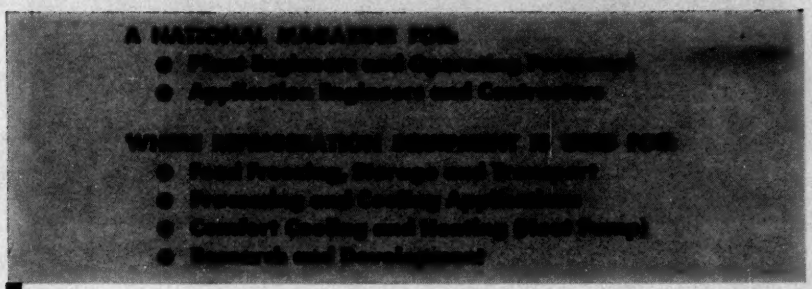

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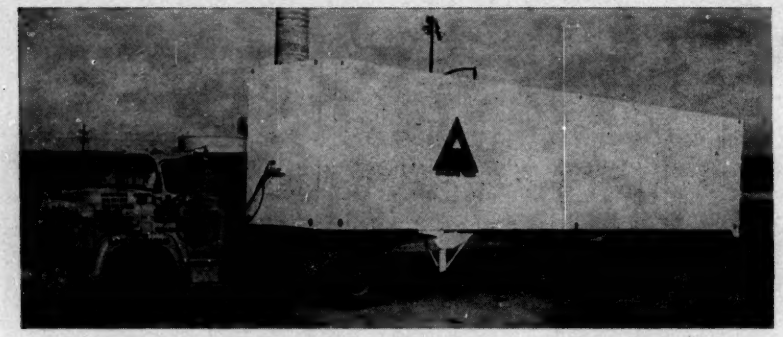
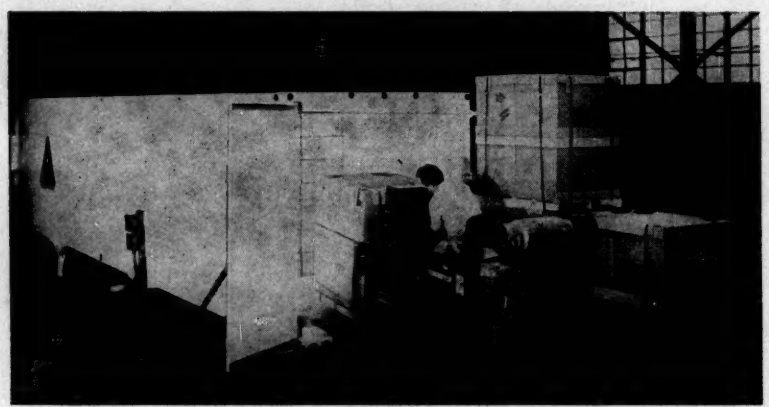
69 Years of Continuous Publication

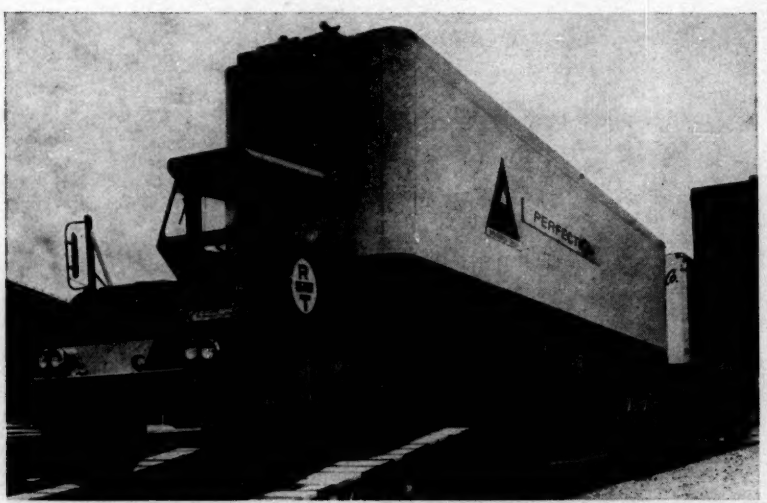
New Refrigerated Trailer Moves Foods To Market



Packing 2184 cubic feet of cargo capacity into its 40-foot length, this new Perfection Reefer weighs 1500 to 3000 pounds less than and is priced competitively with quality grade 40-foot reefers. It exceeds other reefers in five principle areas, according to the manufacturer: better insulation, greater volume, lighter weight, less maintenance and no measurable water absorption.



Payload bonus is represented by the four palleted loads going into the new reefer. Conventional reefer of the same size would leave this extra cargo on the loading dock. The frameless, seamless construction supports the load through unitized walls rather than external frames and beams.



Piggyback or over the highway, this new reefer is said to provide more cargo carrying space with far greater cold retention than any other refrigerated trailer on the road. Made by Hupp Corporation's Perfection Division.

»» MAJOR economies in moving refrigerated and frozen foods to market by highway and piggyback are promised by a new type of frameless refrigerated trailer introduced to railroad men in San Francisco recently.

Departing sharply from conventional design, the new "reefer" makes its own insulation and skin do double duty as the body frame. While standard refrigerated trailers are built as a box and then insulated, the new Perfection Reefer employs a unitized sandwich of rigid insulation and fiber glass reinforced plastic skin in a seamless cube structural frame. The combination of high strength, light weight and superior insulation is said to provide nine per cent more cargo carrying space with far greater cold retention than any other refrigerated trailer on the road.

Developed by Hupp Corporation's Perfection Division, Cleveland, the new reefer will be marketed by Rail-Trailer Company, Chicago. It was unveiled at the San Francisco exposition of the Railway Electrical and Mechanical Association.

Packing 2,184 cubic feet of cargo capacity into a 40-foot length, the new trailer weighs 1,500 to 3,000 pounds less than and is priced competitively with quality grade 40-foot reefers. Its epoxy-welded one-piece wall, floor and roof panels are color impregnated for long, maintenance-free service.

Meets Zero Cold Code

Specially designed to allow haulers to meet new zero-cold requirements for frozen foods, the new trailer is also expected to cut shipping costs for such comparatively light but bulky products as lettuce, eggs and similar produce.

By helping prevent temperature fluctuations in transport, the new reefer will help maintain uniform flavor, texture and color of frozen foods. Butter, meat, fruit and vegetables will remain fresh longer in stores and refrigerators.

At least 85 per cent of the 50,000 refrigerated trailers now on the road can't meet the new zero-cold code requirements for frozen food transport, according to U. S. Department of Agriculture figures. The codes have been proposed by the Association of

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TEMPLETS make ice stronger and reduce its tendency to crack during cutting or scoring and also help produce a clearer cake. White butts, heavy cores, and the cloudy veil that customers don't like are completely or partially eliminated. TEMPLETS help clear ice of imperfections caused by raw hard water.

With TEMPLETS more ice can be made during the peak summer months in the same number of cans, thus increasing daily production. Templets reduce cracking and breaking in the cakes, thus enabling raw water to freeze at lower brine tank temperatures, so cans can be used more often and make more ice.

Start using TEMPLETS today. Once you've tried them you never again will be without them. They are very economical . . . they cost only about a penny a ton of ice.

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Food and Drug Officers of the United States and call for internal product temperature not to exceed zero during loading, unloading or transporting.

Market Potential Strong

Perfection expects its new reefer to capture about 20 per cent of the market for refrigerated trailers in three years, according to Anthony J. DeFino, Hupp vice president. For Perfection, dollar sales potential could exceed $10 million, he said.

At present about 5,000 refrigerated trailers are made annually. Two out of three reefers are operated by for-hire carriers, the remainder by meat packers, ice cream and dairy product makers, frozen food packers and other shippers of cooled and refrigerated products.

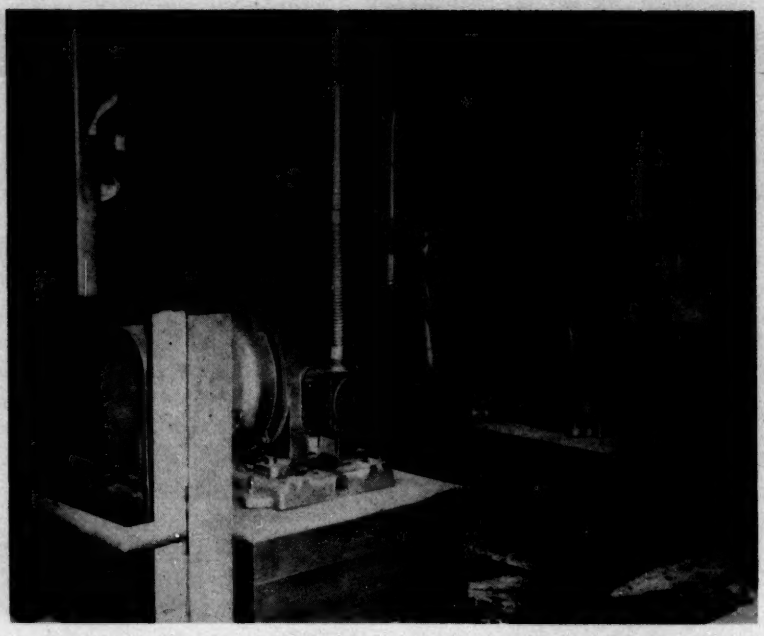
According to Eugene F. Ryan, Rail-Trailer president, railroads themselves now own 26,000 highway trailers. "In addition to the evident demand for highway reefers, more than 120,000 wet iced refrigerated railroad cars will be obsoleted and replaced in the next twenty years, primarily by refrigerated highway trailers carried piggyback," he said.

IAICM Production and Laboratory Advisory Council Meets

»» THE Advisory Board of the International Association of Ice Cream Manufacturer's Production and Laboratory Council reecntly met in Syracuse, New York, to plan the P & L session for the fall Annual Convention. Dates for the Ice Cream Association's Chicago conclave are October 30 to November 2.

Among the possible program topics discussed were antibiotic and pesticide controls. technology in '60, the importance of emulsifiers in the mix, automation—its practical limitations, laboratory efficiency, and the leasing of production equipment. From these areas of general interest, specific subjects will be chosen for presentation at the convention.

This year, for the first time, the P & L Spring Meeting included presentations on various technical subjects. Speakers and their subjects at the Syracuse meeting were: Glenn T. Hoffman, Richman Ice Cream Company, Woodstown, New Jersey, "What Are Your Flavor Costs?" W. C. Woods, Dairylea, Utica Ice Cream Branch, Utica, New York, "Production Controls;" W. K. Jordan, Cornell University, Ithaca, New York, "The Use of Maple Syrup in Ice Cream;" F. M. Skelton, Sealtest Foods, Schenectady, New York, "Research and Production."



Two 100 hp compressors cool 10 storage and precooling rooms. Compressors are located in the basement.

Big Precooler for Citrus Fruits

»» A REFRIGERATION facility which is capable of precooling as many as 60 carloads of citrus fruit to temperatures of 35° to 40°F. has been installed at the Placentia Orange Growers Association packing house, Placentia, Calif.

The installation was made on a lease basis by Temperature Engineering Co., Alhambra, Calif., and uses two 100-hp. motors and compressors to refrigerate the ten separate rooms.

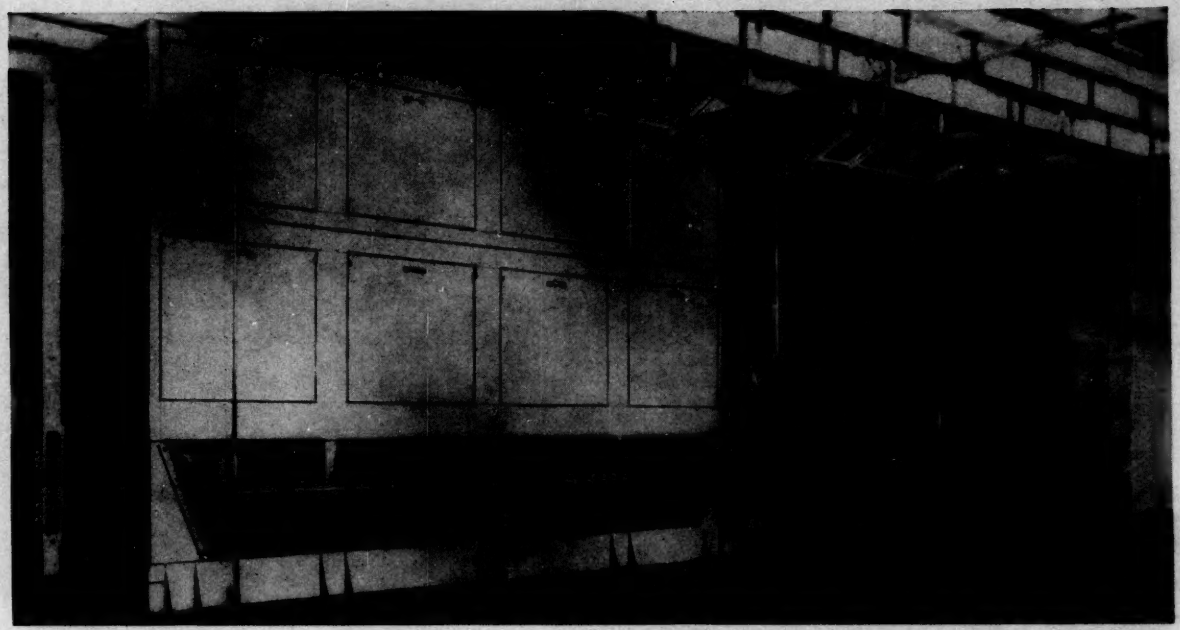
Multiple rooms are cooled in this case to facilitate the storage and handling of cartons full of grapefruit and oranges with differing brand names prior to shipment of the containers by rail or truck. Temperatures of 35° to 40°F. are specified to prevent spoilage.

Motor and compressor components and controls were located in a basement below the precooling rooms in order to conserve floor-level storage space and to simplify the installation of piping for refrigerant circulation.

The packing house in this case has not yet had to utilize its precooling facility to capacity; and, since it is in an area where citrus orchards are being bulldozed to make room for tract housing, there is a good chance that it will never have to store more than 50 carloads of citrus at any one time.

Palletized cartons of oranges are stored in precooling rooms at Placentia Orange Growers Association packing house.

However, house officials claim the cost of extra refrigeration capacity is negligible and will be more than recovered over a period of years if it prevents the spoilage of only one or two carloads of fruit.



Quinton Holland, Goldring chief engineer at control panel. CONTRACTOR: Jennings Refrigeration, Inc., Los Angeles.

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SHIPS 6 WEEKS AFTER ORDER!

Custom-made unit has 110,000 CFM CAPACITY!

When the Goldring Packing Co., fast growing Los Angeles meat processing concern, built a new lamb chilling room they were faced with a refrigeration problem—to secure equipment with enough cooling capacity to hold a 50 x 120 ft. room at a constant 34°F. Ceiling mounted units were out, because of lack of clearance between the conveyor system and ceiling.

A large custom floor unit was the answer and through Pacific Metals Co., western KRACK distributors, the order was placed with Refrigeration Appliances. The completed unit measures 37′ x 12′ x 5′ and was shipped just six weeks after the order was received. The unit is built in two sections, each delivering 55,000 cfm. Automatic defrost is alternated every 24 hours.

Unit required two trucks for shipping. Here one-half of unit leaves Refrigeration Appliances plant at Chicago.

Opening in wall of new addition at Goldring Packing Co., Los Angeles permits entry of each half of the huge Krack refrigeration units.

Whatever your refrigeration problems are, you can depend on KRACK —for units that deliver SAFETY-MARGIN RATING—for QUICK DELIVERY on standard and custom units.

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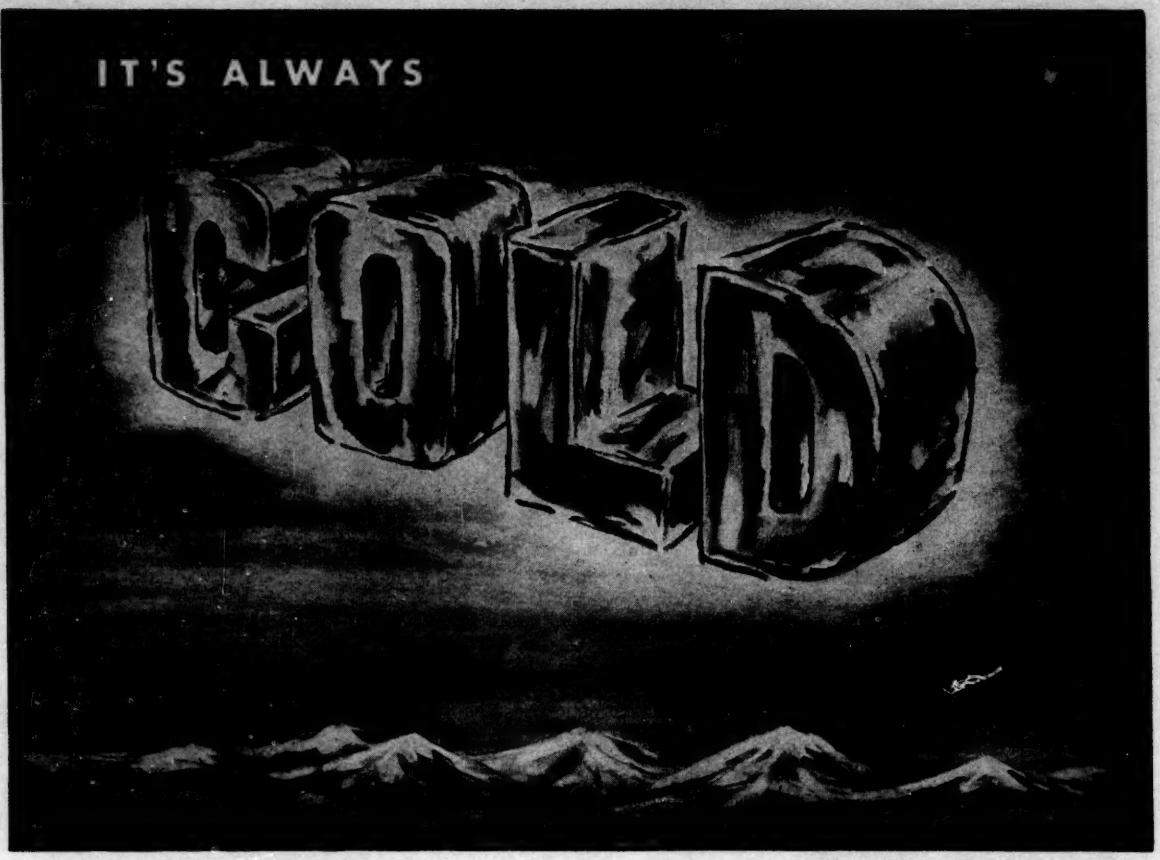

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Maybe it's a basic defrosting problem in industrial refrigeration . . . or perhaps it involves the vital protection of aircraft from the icy upper atmospheres.

For these and scores of in-between applications, Safeway provides a *controlled heat* product, regardless of environmental temperatures. And people who know refrigeration depend on Safeway Heat Elements as a completely reliable and economical solution to defrosting problems in the commercial and industrial field.

Safeway's modern manufacturing facilities are devoted *exclusively* to the design, engineering and application of *controlled heat* for industry. Among the wide variety of Safeway heating blankets, woven and molded heating elements are:

- **heating elements for launching equipment and for airborne gyros, cameras, computers, servos and batteries — for missiles or aircraft**
- **de-icing units for airfoil surfaces**
- **heating elements for all types of ground support equipment**
- **defrosting units for industrial and commercial refrigeration**
- **heating blankets for honeycomb and metal-to-metal bonding**

For your copy of a fact-filled folder, please write:

If it has to be heated (and the "it" can be just about anything), you can rely on SAFEWAY engineers to study your problems carefully, and—without any obligation—submit an appropriate recommendation.

Safeway HEAT ELEMENTS INC.

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news briefs of the month

Chicago's Exposition Center To Have Carbon Filters

The giant 36 million-cubic-foot, fully air conditioned Exposition Center, now under construction on Chicago's lake front, will be equipped with the largest carbon-filter ventilating system of its kind ever installed. The system is unique in that it deodorizes the air as it is circulated. In this issue beginning on page 16 is an excellent discussion of the problems of odor control in air conditioning systems.

Discovery In Shipment of Mature Green Tomatoes

The uneven ripening of mature green tomatoes, on their way to market, has been an annoying problem. In a search for a solution of this problem the United States Department of Agriculture, Agricultural Marketing Service, has made an important discovery. This discovery resulted from tests of tomatoes shipped in a conventional ice-bunker car equipped with electric fans and a modified ice-bunker car equipped with a small diesel engine powering thermostatically controlled fans. The study proved that tomatoes in transit, for subsequent ripening at 70° F., are sensitive to fluctuating temperatures and have a higher yield of saleable tomatoes if protected from these fluctuations. Where even ripening is the goal, a grossly fluctuating temperature is undesirable, even in the non-damaging range of 55°-65° F. Chilling injury, which causes rot and subsequent uneven ripening, occurs if they drop below 50° F. Temperature fluctuations were best controlled by the car equipped with thermostatically controlled fans.

Next Management Development Course For Dairy Executives

Granville Inn, Granville, Ohio will be the site of the forthcoming Management Development Course Sessions for Dairy Executives to be held November 13-19, 1960. Located 30 miles outside of Columbus, Ohio the Granville Inn hosted the successful first week portion of the Course last November which attracted 38 dairy executives. This year both the first and second parts of the Course will be offered. Each of the sessions will be limited to 30 participants to enable them to get the greatest benefit from their participation.

The program, developed under the auspices of the International Association of Ice Cream Manufacturers, is conducted under the direction of Dr. Earl Strong, Professor of Management and Assistant Dean of the College of Business Administration, The Pennsylvania State University. Co-sponsoring this training activity are five dairy associations.

New Literature on Cooling Towers

Betz Laboratories, Inc., Consultants on Industrial Water Problems, has made available a new Water Conditioning Data Sheet entitled, "How To Extend Cooling Tower Life". This data sheet discusses how the deterioration of cooling tower wood by chemical, biological and physical factors shortens the life of cooling towers. Copies are available by writing to Betz Laboratories, Inc., Gillingham and Worth Streets, Philadelphia 24, Pa. For the men charged with the responsibility of tower maintenance, we think this is a useful piece of information to read and keep on file.

Safety All The Time

"Safety . . . Everywhere . . . All the Time" is the slogan of a new, continuing campaign of the National Safety Council. The campaign, aimed at making safety an around-the-clock family affair, will save industrial concerns from conducting separate on-the-job and off-the-job safety campaigns which often compete for employees' attention. Kickoff for the campaign is a 23-minute full-color film depicting the involvement of a factory worker and his family in a near-tragic boating accident. Symbol of the campaign is a black circle within a yellow diamond. Further information may be obtained from the National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill.

The Front Cover Picture

The self-contained power house which supplies heat, refrigeration and electricity to Parke, Davis & Company's new Research Laboratories is pictured on the front cover. With three gas-fired steam boilers, turbine generator and three absorbtion units for air conditioning, the plant is capable of supplying the equivalent of electricity to approximately 700 homes. The laboratory is located in Ann Arbor, Mich.

DIVERSIFICATION

In The Refrigerated Warehouse Business

This series of papers on the general subject of diversification were presented at the annual meeting of the National Association of Refrigerated Warehouses held in Florida last April. To the warehouseman who may be in need of diversification, they offer ideas on what can be done and what is being done by others to diversify business.

Product and Storage Plans

By W. B. CLEMENTS,

Seabrook Farms Co.,
Seabrook, N. J.

»» WHAT effect will the revolution taking place in the frozen food industry have on refrigerated warehousing? And if we were to go back a step further, why does it have to be a revolution? There was a time when "revolution" signified rebellion against tyranny or a trip of the earth around the sun. We are living, however, in an era when breakfast cereals are described as "atomic"; increases in populations as "explosions"; and an expected rise in the economy as "soaring". It is understandable therefore that progress in the frozen food industry should be dubbed a "revolution".

But let us not take the connotation of the term too seriously and rush out to tear down our warehouses. The revolution is not going to take place overnight. The revolution will surely have many casualties, but those who will survive will be the ones who make sure that they are changing in the right direction, otherwise the change would be just change and not progress.

The progress being made in the frozen food industry will be brought about by diversification. By diversification of product, it is true; but diversification of many other things also. And to judge its full impact on warehousing, total diversification must be considered; diversification that covers container sizes, sales areas, consumer preferences, product densities, handling practices, etc.

Changes in carton sizes will probably call for changes in case sizes, and the container industry will have to keep abreast of these changes so that they will be able to supply us with containers that have a minimum of slippage when stacked; that will be self-supporting; and that will not be readily torn by everything that brushes against them.

We know that if we make available what the consumer wants, besides increased volume, there will also follow a geographical diversification of many supply lines—supply lines will pass through existing refrigerated warehouses and which will require additional storage spots closer to the consumer.

These consumers are also calling for product diversification. And product diversification may affect you more than any other changes which may take place in the industry. In this regard, we cannot overlook the new items which will be introduced abroad due to many frozen food factories springing up throughout the world. When news of these items reaches this country, nationality groups here will expect us to produce them; and if we cannot produce them, they will be imported. But regardless of where they are produced, you will have to make provision for their storage.

During the current decade, we can expect to see an increase in the number of products containing meats and sauces. Such products are going to require quicker freezing processes than are necessary with vegetables, to keep bacteria counts to a minimum. This of course will affect those of you who run a combined freezing and warehousing operation, as well as many packers who freeze their own product.

Densities of the new products will likewise enter into the picture and will have to be considered from two angles. We are aware of the effect density has on storage space, but we will also have to be careful that we do not come up with a product which will make it almost impossible to comply with the AFDOUS Code. The density of the product may make it next to impossible to maintain zero.

Aside from the maintenance of temperatures, there is also the pro lem of standardizing the method of taking the temperature. Some technologists are recommending the insertion of the thermometer right into the carton. Can't you picture the mess that will result when the housewife places the punctured pouch into the boiling water and goes about her chores, only to return and find a mixture of sauce, water, vegetables and polyethylene.

Many of the new products will not have as long a storage life as blanched vegetables and this will result in more turnover as well as a more pressing need for adhering to "first in, first out" inventory.

This inventory control, having become more complicated by the introduction of a greater number of products in a greater number of sizes, will demand a higher caliber of personnel to supervise warehousing, handling and loading operations. Now is the time to train your personnel so they will not themselves become "casualties" in the revolution.

It is evident from all this that there is no one storage plan that I can give to all of you so that you will be ready for the "revolution". The problem will affect each one differently, depending on the factors I have thus far indicated. And I have not exhausted the list (I have not even mentioned the role you may play in servicing the growing vending machine business).

But enough of the future . . . . True, you will have to start now to plan for the many new things to come, but the main thing is to take advantage of the changes that are occurring now!

The packer and distributor is no longer just a buyer of space. He is becoming a buyer of space with services—and very often the services determine where he will buy his space. Unless this idea strikes home, the space problems of the astronauts will be minor compared to yours. Here are the services that packers and distributors are requesting and, in some cases, receiving at the present time.

1—Packers need in-transit points for shipment of their inventories around the country. If you can offer them this service, you are going to cut into their storage business. And they need this in-transit refrigeration for truck as well as railroad shipments.

2—Do what you can to help the packer and distributor move their goods at the lower T/L rates. You can do this by acting as the shipper of a number of LTL lots and combining them so that the truckload rate could be taken advantage of.

3—Have you offered the distributors in your area a trucking service? Others have.

4—Are you really on the bandwagon, beating the drum for frozen foods? Or are you naive enough to think that the fluctuations in sales does not affect you. Some warehouses have established their own public relations program and use it to push frozen foods.

5—Have you ever made a survey of the market in your area to see what footage of cabinet space is being given to frozen foods? This sort of service helps the packer better assess his position in the market and enables him to take the first step toward moving more volume through your warehouse.

6—Are you willing to tie up some of your money in loans to the packer against inventory stored in your own or other warehouses? Very often this may be the thing that determines whether the packer will be packing next year or not, and if he doesn't pack, well . . . . no pack—no warehouse income.

These are some of the services you should be offering at the present time. The alert warehouseman no doubt will think of many others. The main point, as stated before, is to take advantage of the changes occurring at the present time while planning for the many new things to come. Join the "revolution" and move with it, moreover a moving target is less vulnerable in this conquest of space.

DIVERSIFICATION — Distribution

By GEORGE F. HILGEMIER Jr.
South Side Cold Storage Co.,
Indianapolis

»» I AM going to talk to you about the frozen food distributor and the "How To" aspect of getting into the distribution business. Since we are operating both a refrigerated warehouse and a distributorship under separate corporations, I will try to set forth the "How To" objectives in the same manner as if you were going into the distribution business alone such as we have ourselves. I am by no means an expert on this subject but since we are a distributor I would like to express our company's thoughts.

First of all we had better set forth a few assumptions. Why is there a need for diversification in the cold storage warehouse? Let us assume then that the ones who are interested in being a distributor have plenty of additional storage space for lease or occupancy and that these people are looking toward the distribution business for additional revenue. If you have 100% occupancy then why diversify? Secondly, the reason for looking toward a distributorship for diversification is because it is a natural affiliation for the warehouseman due to the nature of his business.

Now let us look at the chances of survival for a distributor. First you will have to analyze the following: (1) Make a market analysis as to the various types of potential buying customers; (2) Analyze your competitor; (3) Analyze the brands present in the market.

Now let us take a closer look at each of these. What type of customers do you have? We classify ours as chains, independent supers, co-ops, and institutions. In the Indianapolis and surrounding area, we have one local and four national chains. We only sell frozen items to the one local chain. However, we do deliver to some of the national chain stores some cooler and so-called dry items. The second type of account is what we term as independent super markets. This customer is a store that does in excess of $30,000.00 per week in gross sales and is not affiliated with any co-op.

If this account is doing $30,000.00 per week then you can expect to obtain 5% or $1,500.00 per week in frozen food sales. What portion of the $1,500.00 you can obtain would depend upon you and many other aspects. I might add that the $1,500.00 is based upon selling price which would realize around $1,100.00 of sales to you. I would imagine that in different parts of the country, the percentage of frozen food sales to the total amount of food sales will vary. We use in our area a 4% figure as a basis. It also depends upon how aggressive the store operator is in promoting frozen foods. Does he have adequate cabinet display cases? Does he keep them clean and well

stocked? Are they modern equipment? Do your customers know what return they are getting per lineal foot of cabinet space? All of the above is true no matter into what classification the account falls. The co-ops are the best potential group the distributor has.

Serve Co-ops

In our area we have several co-ops but only six make up the majority. We are affiliated with two groups who have a membership of around 430 stores. These two represent approximately 50% of all the co-ops in our marketing area. With these two co-ops we have initiated a plan whereby we are their frozen food department. For this we rebate the co-op a percentage of gross sales and in return we get two things. First, we are keeping the co-op from going into the distribution business which hurts us as a distributor and you as the warehouseman as well. Secondly, our entire frozen food list becomes published in his weekly order book, therefore, we do not have salesmen calling on these stores and of course the savings are passed on to the stores. We could not afford to pass on these sales costs if we were to call on each store individually. The whole idea of the co-op is to show the store operator that he is buying merchandise cheaper by belonging to the co-op than they could if they bought on their own merits. It's a terrific deal for all concerned.

Our last classification is the institutions. These accounts are any account that prepares the food for resale. They are the restaurants, schools, drive-ins, hotels, hospitals et cetera. We as well as many other distributors are striving for more of this type of business due to the fact that it is a good volume business and the returns are high. At the present time we are running fairly close to 50% of sales in this category. It might be wise to point out that any bid contracts for schools or state institutions realize little profit, if any, for the distributor. The only advantage for this type of sales is that inventories turn over quicker and they help your buying power from the standpoint that it allows you to purchase direct from the manufacturer at truck or car pricing rather than to buy exwarehouse.

2—Analyze your competitor. How many frozen food distributors are in your marketing area and how long have they been established? Also see if you can obtain what percentage of the market they now control. If the distributor is presently leasing space from you or if you have a possibility of leasing space to him at some later date, then, I would advise that you should not go into the distributing business. This is, of course, if he is a factor in your marketing area. Another point to keep in mind is that a distributor will put as little as possible in outside storage and he will buy as little as possible from other customers who store in your warehouse. In fact you, as a warehouseman, will realize a leasing profit and very little more. Then again this depends upon how small or large is the distributor.

Pick a Brand

3—Analyze the brands present. What established brands are in the market? What brands are available for you as a new distributor? If a good national brand is still available for distribution, then why has it not been in the market before now? This is especially true in fruits and vegetables. Is your area such that it lends itself to a private label? Many chain stores and co-ops have their own private labels and they will use a national label along side of their own to help promote their own. By this I mean that they will over-price the national label in order to encourage Mrs. Consumer to buy theirs. Then too, some will promote the national label and use a price label as a second label. Frozen foods are playing a more important part now in attracting people into shopping at certain stores.

Now, what does it take to get into the distributing business? We feel that there are three requirements and they are that you have: (1) Proper financing: (2) Competitive pricing: (3) Offer adequate service. Let's look at proper financing and adequate service together. Naturally you must have inventories, but how much? In 1941 when we began, we had a total of 28 items and now we have in excess of seven hundred which are divided into 370 retail items, 250 approximate institutional items, 65 cooler items, and 20 dry items. Naturally you do not have to have all these items but you should have at least 300 which would result in carrying an inventory of approximately $100,000.00, and, of course, you should try to turn your inventories over as many times as you can. Our inventories run in excess of $200,000.00 and we turn them on the average of 15 times per year.

Delivery Service

The next largest investment as you well know is the cost of refrigerated vehicles. How many depends largely on what service you have to offer. For instance, we operate 11 refrigerated trucks, one 38 foot refrigerated trailer in which to haul merchandise to our two branches and two panel trucks for quick emergency runs. We cover the city of Indianapolis each day offering the institutional type trade anywhere from 1 to 5 deliveries per week. The retail trade, we usually deliver twice per week depending on the size of the account. The immediate downtown area we service twice per day and it is conceivable that we will deliver to the same account 10 times per week. In the immediate outlying area on within a radius of fifty miles from the city limits we service once per week. The same picture holds true in both of our branch operations. Naturally labor plays a big part since you are a service organization such as you are in the warehouse. In our small operation we have 43 employees of which 7 men are warehousemen, 11 are drivers and the balance making up the sales force, office, and management. Some of you are probably wondering how much is our selling expense.

Our expense is averaging 3.2% of sales which includes the salesman's base pay plus commissions, plus fringes like a furnished car each year, paid hospitalization and life insurance plan, and includes all business promotions and advertising.

The last point to cover is naturally pricing. You have the product, the space, the labor and now how do I establish my competitive price. This is the $64.00 question. All I can say here is whatever the traf-

fic will bear. Some distributors base their price on so much per dozen over cost no matter what the cost of the item is. You can see that this would realize a small percent especially if the cost is high per dozen. This distributor, if he uses the above, knows how much he needs per dozen to meet his overhead and realize a profit. We have tried them all and have found that a stable pricing arrangement to be the best. We base all of our pricing upon exwarehouse costs. If the packer does not have warehouse stocks then we establish a warehouse price which usually runs in the neighborhood of 4-6c per dozen or 2c per pound. We have found that the retail items will be marked up anywhere from 7 to 22% while the institutional items will return from 25 to 30%. It so happens that our return is approximately 14% on an estimated three million dollars of sales. Of this you can expect to net from 3/4% to 1%. Do you think it's worth the trouble to realize so little a profit?

In conclusion I would like to say that if you enter this type of business and operate it as part of your warehouse, then of course, you can affect certain savings. First, your warehousemen can receive, pack and load your trucks. Secondly, your office can handle orders and billings along with your warehouse receipts, releases, and billings. Thirdly, your management can buy, price, and set up promotions. Then again it all depends upon how well staffed is your present warehouse operation.

DIVERSIFICATION — LTL Operations

By C. A. MARTIN, Jr.

Polar Refrigerated Services,
Nashville

»» LAST month I had the pleasure of being on a panel at the convention of the National Association of Frozen Food Packers on the subject of "Frozen Food Transportation: A bold new decade." A portion of my remarks there was devoted to LTL (Less Than Truckload) delivery service, which is my subject here.

Within the past two years, I have made several talks, written several articles, been quoted in several trade journals, traveled no less than 100,000 miles selling LTL services from my warehouse in Nashville, Tennessee. Why? Because I am sold 100% on the idea that a commercial warehouseman should offer as one of his services an LTL delivery service through the use of ICC regulated refrigerated common carriers operating from his city. In the past, we have had only two transportation services to offer our customers. Those being:

1. Carload storage-in-transit from production plants to carload buyers at the time of sale.
2. Pick up service of ex-warehouse stocks of packers or customer owned merchandise.

Now, the frozen food industry is demanding and we have the opportunity to offer a third service, that being: Delivery of small quantities to frozen food buyers' doors which cannot reasonably or economically come to the warehouse or accept delivery in carload or truckload amounts.

I am fully aware of the fact that establishing an LTL delivery service is not the most simple task you have facing you. I spent over two years and several thousand dollars to get into the business before we sent out our first load. The following is some of the things we had to do and I believe you also will have to do:

1. Locate a good, financially sound certified common carrier that has the best refrigerated trailers money can buy. Trailers that can deliver products to your customers at 0°F. or lower during the hottest days of the summer, when the roof temperature is 120° F. or more.

2. Have this carrier agree to purchase 16 foot and 20 foot "bobtails" to use over the road with the same refrigerating capabilities as the trailers discussed above.

3. Sell this carrier on the usefulness of LTL service so he will spend several thousand dollars for ICC hearings in order to get the necessary unrestricted frozen food authority into the points you wish to deliver.

4. Have the carrier establish a terminal in your city so that he can keep an inventory of equipment on hand for your use.

5. Have the carrier establish routes for delivery to specific points on specific days of the week. Above all, have his assurance that he will run his trucks even though you are not lucky enough to have a pay load for him.

6. Establish in your own organization a traffic department which will work closely with the carrier in making rates, consolidating shipments, handling claims and serving as your direct representative with the carrier and customers of the service.

7. Last but certainly the most important! Sell your customers on the use and efficiency of your service. Every packer in America wants an LTL delivery service but not 10% of them will admit one can be worked.

I don't know how many warehouses across the nation are today performing a frozen food LTL delivery service. (We are in our third year). I know that some warehousemen have gone as far as establishing their own carrier divisions for such a service. I am acquainted with one association and understand the workings of other forms. In my area, I am not sure we could do either of these.

In the first place, for the tonnage we are now handling after just three years of operation would require an outlay of one-quarter million dollars in equipment. Equipment which we would use about 50% of the time. This is expensive, therefore, I continue to emphasize the tie-in of a common carrier.

In the second place, I am not sure we could "limit" our customers so to speak to certain packers, brokers or associations. Being a public warehouse, I believe we must at all times be in a position to handle each customer on an equal footing. To me, every man on the street is a customer of mine and I don't want anything to in-

terfere with me getting to him.

In conclusion, I want to mention a little about temperature requirements insofar as commercial practice and the AFDOUS code is concerned. Whether we like it or not, there is a code and we must be in a position to live with it.

I think the most dangerous (if you can call it danger) part of the code is in the handling of LTL shipments so as to deliver at 0°F. Our tests have shown that we must precool a truck to 20°F. before loading, have our product temperature at least -10°F. (-15°F. in the summer months) at time of loading, require two men on the truck during loading and use tarpaulins on the tail of the truck. We have found that in following the above steps we have encountered very little trouble.

DIVERSIFICATION

Processing

By VIRGIL WEEKLEY,

Richmond Cold Stge. Co.,
Richmond

»» LAST spring the opportunity to buy a small frozen food processing operation presented itself. We had, for quite some time, been on the alert for a chance to diversify to some degree. After looking the project over carefully and at great length we decided to buy, and became the manufacturers of the only frozen Spoon Bread on the market, as far as we know. Our carpet bagging friends may not be familiar with this delightful southern dish, but in the south it is equally well known as hominy grits, but quite dissimilar in make-up.

After the purchase took place we moved the operation to our warehouse where we had turned a seldom used room into a quite adequate kitchen with a built in freezer room. The product is mixed, cooked, frozen and packaged in this room, then stored in our warehouse where, I might add, we enjoy competitive rates. At the moment we manufacture only the one item although there are several other formulas worthy of consideration.

Our sales are set up with brokerage representation. Presently we are concentrating our efforts mainly in Virginia and several nearby heavily populated areas and have the product in all the leading chains and co-ops. Advertising is done mainly through the media of newspaper and radio. At the moment we are satisfied with the progress of the venture and see no reason why modest increases should not be expected.

This entire project has been quite an education for us. The problems of marketing and transportation have certainly made us even more aware of the needs of our warehouse customers and we hope we have learned enough to be of some extra service to these friends.

DIVERSIFICATION

Other Applications

By HARRY M. SPRADLING,

Carthage Ice & Cold Stge. Co.,
Carthage, Mo.

»» THE report from Midwest Research Institute last year confirmed our thinking that something must be done with our company; either diversify, consolidate, sell out or go the route of the Ice Industry.

Since we are located in a small city in Southwest Missouri, with a rather large investment, it was not likely for us to sell out without sacrificing greatly our investment. There is very little use for our building other than as a cold storage. We were not particularly interested in consolidating, so we concentrated on trying to diversify our various departments.

This year we put in "Pipeline Refrigeration", which has met with modest success. The reason for this is because, first, we sell ice and we know its life is very short; so, not only will we give our customers service with high and low side refrigeration for their rooms, but if they decide to turn to manufacturing their own ice, we will not lose all of their business because they will have sufficient refrigeration to make their ice cheaper than they can afford to put in the necessary machinery plus the requirement of engineers.

We have installed a Liquid-Freeze operation in a poultry plant. Again, this could be called customer-relation. The customer desired this type of operation because of the improved appearance of their product. This machine is leased to them over a period of years in addition, we make a charge for refrigeration and then the product is brought to our blast freezer where an additional charge is made.

Again, primarily to give our customers additional service, we went into the institutional distribution business. Our customers are either national or regional in scope; but they either lack personnel for local distribution of their product, or the area is too sparsely populated for them. We, therefore, bought a small distributorship and we are now handling a number of various types of products frozen cooler items, and hot pack.

Along this same line, we realize that generally there is no place for a distributor to the grocery stores, so we are working with the local chains on a warehousing and store-door delivery basis.

This, in turn, allows us to talk with them on leasing space for semi-processing or processing of such items as pre-packaged meats, eggs, fruits and vegetables.

Our locker department, as most locker plants, has been going down hill in recent years, so to bolster it, and since we have our own distribution system, we are now processing and packaging various meat items for the immediate area.

We are fortunate to have built processing plants in and around our plant, or to have been the cause of plants being built. This really has been our salvation and we are continuing this policy. This year we built a cheese plant and assisted with a poultry plant. By assisting, I mean that our city has an Industrial Development Corporation of which I am president.

Consequently, the development corporation donated the land for the poultry plant and they built their own building. The development corporation also purchased a site for the future plant of a milk and cheese manufacturing plant.

With these various activities, it has been necessary to expand our facilities, but I can assure you that the expansion did not cost us anything like our original buildings did. We think the future is bright. However, we are looking at the cold storage business today in a much different light.

H. C. Diehl Heads Frozen Food All-Industry Coordinating Committee

»» PRESIDENT Herbert Farnsworth of Trans-American Refrigerated Services, Ltd. announces that, by unanimous action of the directors of TARS, the services of their managing director, Dr. H. C. Diehl of Colorado Springs has been loaned on a part-time basis to the recently formed Frozen Food All-Industry Coordinating Committee in the capacity of chairman of this committee and spokesman for the organizations named below. This action was taken at the request of the several industries comprising this Committee.

Represented officially on this committee are American Meat Institute, American Trucking Associations, Institute of American Poultry Industries, National Association of Food Chains, National Association of Frozen Food Packers, National Association of Refrigerated Warehouses, National Association of Retail Grocers, National Fisheries Institute and National Frozen Food Association.

An all-industry program involving completion of standards of industry practice that are based upon sound research and that are appropriate, realistic and industrially practicable, and that can be effectively self-policed within the frozen food industry, is rapidly taking shape under the guidance of a committee.

Dr. Diehl's services have been drafted in order to permit formulation and implementation of this cooperative industry enterprise during the next several years.

Dr. Diehl has been conspicuously identified with the frozen food industry since 1924. In 1931 he directed the establishment of the U. S. Frozen Pack Laboratory in Seattle. For many years he was in charge of food processing for the USDA in the Pacific Northwest, and he was Chief of the Commodity Processing Division of the Western Regional Research Laboratory at Albany, Calif. He has been a consultant to the Laboratory since 1951.

Between 1943 and 1958, Dr. Diehl established and headed The Refrigeration Research Foundation which achieved worldwide leadership in scientific research and which actively encouraged the Time-Temperature-Tolerance Investigations of USDA.

He is a member of many professional and scientific organizations, and is the author of more than 100 USDA bulletins and trade and professional articles. He was graduated from Michigan State University in 1918 and did graduate work at Johns Hopkins University, the University of Maryland and Washington State College. He received an honorary Doctor of Science degree from the University of Rhode Island.

Committee Meets

The Frozen Foods All-Industry Coordinating Committee held a very important meeting at The Drake Hotel in Chicago on June 24, under the Chairmanship of Dr. H. C. Diehl.

Most noteworthy was the large attendance from all facets of industry concerned with frozen foods, either as active Committee members or as interested observers. The following member groups were represented: American Meat Institute, American Trucking Associations, Institute of American Poultry Industries, National Association of Food Chains, National Association of Frozen Food Packers, National Association of Refrigerated Warehouses, National Association of Retail Grocers, National Fisheries Institute and National Frozen Food Association.

In addition, as observers, the following organizations had representatives present: Super Market Institute, Railroad-Owned Refrigerator Car Committee and National Frozen Food Locker Institute. Also participating were representatives from The Refrigeration Research Foundation, University of Massachusetts and Western Regional Research Laboratory of USDA.

Representatives of each industry group reviewed the actions already taken and the several research and educational programs presently in progress in their respective industrial fields to bring the protection of frozen food quality, from producer to consumer, to the highest possible state of consistent efficiency.

Among the important decisions approved by the Committee membership were:—

1. The immediate formation of State or area Committees, composed of representatives of all organized State or area industry groups, concerned with frozen foods. Such Committees are to be alert to every significant legislative or regulatory development in their localities, are to be closely in touch with the Chairman of the All-Industry Committee and are to assist in carrying into action such programs of education and self-policing as the All-Industry Committee carries on and encourages for the consistent maintenance of highest quality in frozen foods.

The Committee also approved the preparation of a manual of instruction and procedure for these State and area Committees to the end that their activities be most effective and well-coordinated with the All-Industry Committees actions and program.

2. Approved the suggestion of Dr. M. J. Copley of the Western Regional Research Laboratory that Association leadership and key Committee personnel of AFDOUS be invited to participate in a review of information developed by the very comprehensive time-temperature tolerance investigations at this USDA Laboratory. This meeting is scheduled for November 4 to 6 at the Laboratory in Albany, California and will be attended also by members of the All-Industry Committee.

3. Approved the appointment of a coordinating sub-committee to integrate all sections of the standards of quality control practice, now being prepared by the several segments of industry concerned with frozen foods, such standards to serve ultimately as a universal guide in the frozen foods industry in the voluntary self-policing program.

4. Re-emphasized the Committee's intention to base its quality control program on the scientific facts developed by the investigations at the Western Regional Research Laboratory and by other Federal and State research agencies, with the counsel of The Refrigeration Research Foundation.

5. Approved the appointment of a sub-committee to study, encourage and integrate to mutual advantage all forms and channels of educational material, with the objective that every person producing, transporting, warehousing, distributing and merchandising frozen foods will know and will employ consistently the procedures, which will give maximum protection to the commercial quality of frozen foods.

Odor Control In Air Conditioned Spaces

Odor is defined as that property which excites the sense of smell. In this article the author discusses the sources of odors, detection and measurements methods, effects of temperature and humidity on odor and how to control odor in the air conditioning system.

By **WARREN VIESSMAN**
Mechanical Engineering Consultant for Installations Headquarters Air Research and Development Command, Andrews Air Force Base

»» AIR conditioning is defined in the Heating, Ventilating and Air Conditioning Guide as "the process of treating air so as to control simultaneously its temperature, humidity, cleanliness and distribution to meet the requirements of the conditioned space." This is a brief definition and could be expanded to more fully cover the quality of the air. The definition implies an odor free condition as a component of cleanliness.

Odor is defined as that property of a substance which excites the sense of smell. To be odorous, a substance must be either already in a gaseous or vaporous state, or possess a vapor pressure[1]. When the concentration of odorous vapors in the air is insufficient to permit odor perception, the air is commonly said to be odor-free. Therefore, to eliminate or abate an odor condition, it is necessary either to remove the offending gases or vapors or adequately reduce their concentration.

Odor Sources

The sources of odors resulting in discomfort to individuals in occupancy areas are many. In offices, arenas and other inclosed spaces, obnoxious odors may be body and tobacco smoke odors. Cigarette smoking may produce objectionable pyridine and ammonia odors and irritants as well as impair visibility[2]. Discomforting and toxic odors may be introduced from the outside atmosphere and contain a high percentage of hydrogen sulphide, industrial effluents or smog. In industrial spaces the air may contain chemical and product odors such as printing ink, dyes, synthetics and odors from manufactured rubber products. Odors may be contributed by linoleum, paint, upholstery, rugs, drapes, etc. Food, cooking and putrification of animal and vegetable matter are also frequent contributants. They may also occur from air conditioning coils, as the metals and coatings used materially affect the likelihood of producing objectionable odors[3].

Odor Evaluation

Odor detection and measurement must ultimately rely upon olfactory observations and human appraisal. A trained organoleptic panel is presently the best method of evaluating odor intensities as the nose is still the best instrument for odor perception. An arbitrary preference scale of increasing odor values is selected. The sensory scale utilized by Yaglou[2] for cigarette smoke classifies odor as: (0) imperceptible; (1) not objectionable; (2) acceptable; (3) objectionable; (4) endurable; and (5) intolerable. This scale has been found convenient for use in air conditioning odor investigations. As discrimination develops with experience, the objective sensory scale can be divided into more steps.

Another method bases odor intensities on multiples of threshold concentrations. This has been employed by Hopper[4]. In this method a source of odorless air and a method of mixing it in easily variable proportions with the odor sample is used. The mixture is adjusted until the odor can be barely discernible. The result, expressed as the ratio of mixture volume to sample volume is called the number of thresholds. At threshold, or just discernible intensity, the nose is operating at its most sensitive point. The number of thresholds has a useful meaning. For instance, 10 thresholds has the implication that one cubic foot of odorous gas can taint 10 cubic feet of air to a recognizable level[5].

Odor Adaptation and Irritation

Odors may not only be objectionable but may cause irritation. Tests made by organoleptic panels have indicated that first inhalation or impressions of cigarette smoke have in the majority of cases, been higher than second or later inhalations. This indicates that perception is affected by adaption to odor intensity. Adaptability begins immediately and takes place more rapidly during the initial stages of exposure.

Perception intensities as a function of time have been determined by Kerka and Humphreys[6]. A smooth curve indicating trends has been developed from the test data and is given in Fig. 1. In the case of irritation, which is confined mostly to the eyes and nose, the investigators found that the irritation increased with time, approximately as shown in Fig. 2.

Humidity and Temperature Effects

Research has indicated that odor perception of cigarette smoke (suspension of tobacco tar droplets plus vapor), and pure vapors are affected by temperature and humidity. An increase in humidity at constant dry-bulb temperature has the definite effect of lowering the intensity level of cigarette smoke as well as of pure vapors[6]. This is shown in Fig. 1. The effect is more pronounced for some odorants than for others. An increase of temperature at constant specific humidity lowers the odor level of cigarette smoke slightly. While the perceptible odor level of cigarette smoke decreases with time of exposure, irritation to the eyes and nose generally increases. The irrita-

tion is greater at low relative humidities, as shown in Fig. 2.

In order to keep odor perception and irritation at a minimum the air conditioned space should be designed for about 50 to 55 percent relative humidity. Since temperature has but slight effect on odor level at constant specific humidity, it can generally be ignored and the temperature maintained for the desired conditions as affected by comfort or economy.

Adsorption and Release Of Odors

Tests have been made on the odor adsorption and release of environmental materials such as wool, nylon, rayon and fir wood[4]. It was determined by using iso-amyl acetate as the odor agent, that the odor adsorption of rayon was negligible. It did not adsorb enough odorant to be measured by the test methods employed. The odor adsorption at the end of a 24 hour charging period was about the same for nylon and cotton at the same temperature and humidity, Fig. 3. The odor adsorption of wool samples under the same test conditions was less. Adsorption of the wood samples was less than nylon and cotton, but more than wool. At 50 RH, maximum odor adsorption, during the 24 hour loading period occurs at about 75 F for nylon, and is considerably less at 60 F and 90 F, Fig. 4. At 75 F, odor adsorption during the same period was found to be greater at 50 RH than at 85 RH.

Odor retention or release as a function of airing time is affected by temperature and humidity. For the fabrics tested and for 75 F 50 RH conditions, odor retention after 1000 minutes was reduced to 6.8 percent for cotton, 12.3 percent for nylon and 25.8 percent for wool. In the latter case the initial wool retention was only about 25 percent of that of cotton or nylon. After 1000 minutes the odor retention of wool was favorable to that of cotton. Wood lost its odor retention after 300 minutes.

These data are meager, but indicate a trend useful for design. Application of the quantitive values should not be made without due consideration to the finish,

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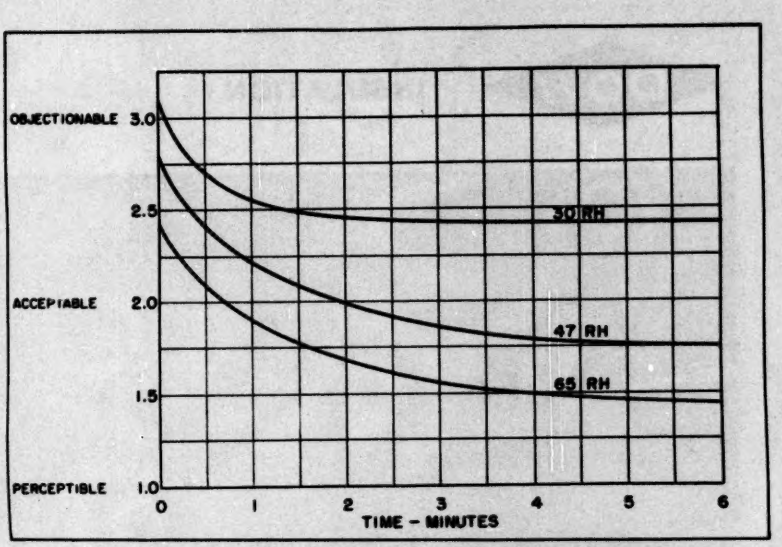

Fig. 1 Odor Perception Of Tobacco Smoke With Time & Humidity

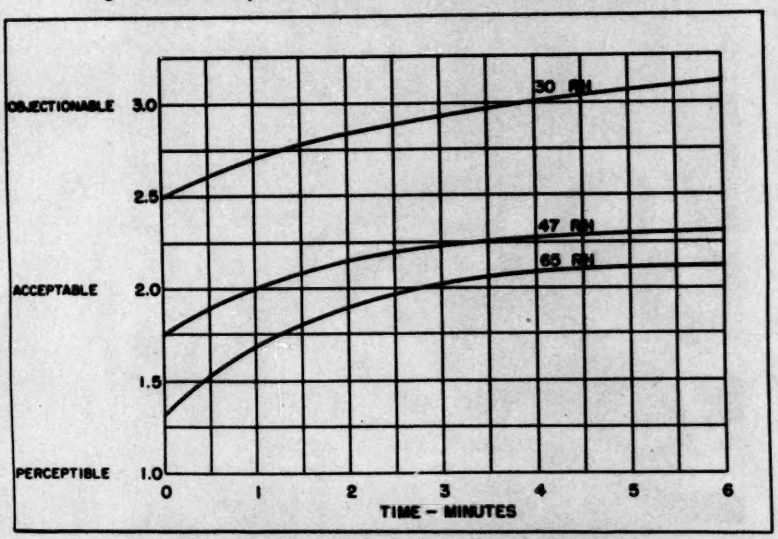

Fig. 2 Irritation By Tobacco Smoke With Time & Humidity

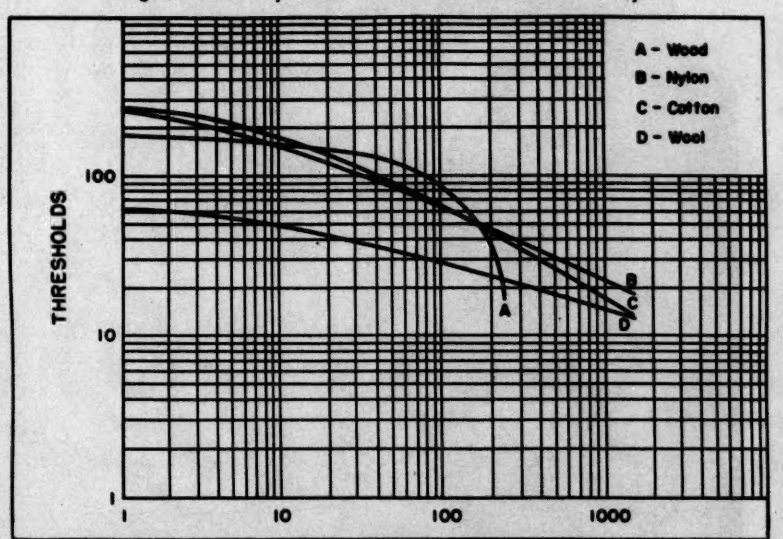

Fig. 3 Airing Time—Minutes

DOW | INSULATION

Mr. Harry Schreckinger, senior partner of Globe Cork, inspects Chock Full O' Nuts' new commissary freezer (background).

CHOCK FULL O' NUTS TURNS OVER ALL COLD-ROOM PLANNING AND CONSTRUCTION TO AN APPROVED INSULATION CONTRACTOR

"Globe Cork Insulation Company—a Dow Approved Insulation Contractor – assisted with the planning and construction details of the new 13,000 cu. ft. refrigerator in our commissary. This freed our own design departments for other work in expanding our coffee plant and bakeries," says Mr. Samuel Ostrove, V.P. of Chock Full O' Nuts, New York restaurant chain.

"Globe also helped plan and build other refrigeration and freezing units in our commissary and in two of our new restaurants. We told them what units we needed and how big they should be. Globe did all the rest—installation and supervision – using Styrofoam® insulation, which keeps our refrigeration rooms at a constant 35° F., and our freezers at an even ten below."

Globe Cork relies on Styrofoam* because this low-cost insulating material is durable, has a low "K" factor that *stays* low, and does not attract vermin—a vital consideration where food is involved. In addition, lightweight Styrofoam is so easily handled that installation costs are minimized.

Styrofoam contains millions of tiny, non-interconnecting air cells which provide high resistance to water and water vapor. Water doesn't penetrate, to freeze, swell and crack the insulation. Insulating efficiency stays high over years of service, regardless of humidity.

The man who displays this seal is a Dow Approved Insulation Contractor. He's one of the special group of low-temperature insulation contractors selected by Dow for their experience and abilities. Each of these contractors has an excellent business reputation, based on high quality workmanship; and each takes great care to follow Dow recommendations for installing Styrofoam.

There's an Approved Insulation Contractor near you. Contact him when you next plan to install low-temperature insulation. He'll provide invaluable assistance at every step in the operation. For the names of Approved Insulation Contractors near you, write THE DOW CHEMICAL COMPANY, Midland, Michigan, Plastics Sales Department 1641BU8.

**Dow's registered trademark for its expanded polystyrene.*

The closed cell structure of Styrofoam controls the passage of heat, water and moisture, providing permanent insulating efficiency. Cold rooms stay uniformly cold, easing the operating load on refrigeration equipment.

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

Table 1—Ventilating Design Conditions—Washington, D. C.

Column	A	B	C	D	E	F	G	H	I	J	K	L
Season	Vent Air cfm	Outside			Inside			D-G	Heating Deg Days	Heating Days	Heating hours	Cooling hours
		Temp		Enthalpy	Temp		Enthalpy					
		DB	WB	BTU	DB	WB	BTU					
Summer	1000	95.0	78.0	41.6	80.0	66.8	31.5	10.1	....	....	....	810
Winter Av.	1000	45.5	40.5	15.5	73.0	61.0	27.2	11.7	4300	220	2200	
Winter Max.	1000	10.0	9.0	3.5	73.0	61.0	27.2	23.7	4300	220	2200	

A, B, C, E, F—Design Data, 1959 Guide, Chapter 13, Table 1 & 2, p 168 & 170 and Air Conservation Eng., p 64
D, G—From Psychrometric Chart for B, C, and E, F
H—Heat gain or loss
I—Degree Day Table—1959 Guide, Chapter 37, p 529
J— $\frac{1}{65\text{-}B_{av}}$, From Air Conservation Engineering, 1953, p 15 and 64
K—based on a 10 hour day
L—1959 Guide, Chapter 54, Table 5, p 730

weight, weave and thread count of the fabrics. Further research is needed relative to these items. On a qualitative basis, wood quickly gives up odors absorbed. Wool has low odor adsorption at all temperature and humidity combinations tested. Nylon and cotton adsorb large quantities of odors at an optimum condition of 75 F and 50 RH. They act as a sponge, readily adsorbing odors from a tobacco smoke filled room, and releasing them more slowly over a longer period. This indicates that the selection of drapes, floor coverings, etc., are important air conditioning considerations.

While it has been shown that smoke, cooking and body odor perception is decreased with humidity increase, where the odor source is intrinsic with the materials, as in the case of linoleum, paint, rubber and upholstery, a reduction of relative humidity would be beneficial[7], as this would decrease the rate of odor release.

Odor Removal

Odor removal may be accomplished by physical or chemical means. Ventilation with clean outside air, air washing or scrubbing, charcoal adsorption and masking are physical methods available to the engineer. Chemical absorption or destruction of odor sources, vapor neutralization, masking and catalytic combustion are other means. Of these, air washing or scrubbing and combustion are processes of considerable value to process industries. Washing and scrubbing, like filtering are applicable to the removal of particulates and in some cases are means of valuable product recovery. Where odors are associated with the particulates, they are indirectly removed. Combustion of obnoxious gases is quite efficient and practical where indicated by economy. These methods are employed to alleviate the effects of harmful exhaust gases and particulates on health, vegetation and property. Ventilation and charcoal adsorption are effectively and extensively utilized in air conditioning for odor removal by the air conditioning engineer.

Ventilation is effective in removing the contaminated air in an enclosed space by logarithmic dilution. In this process, the vitiated air containing objectionable gaseous odors, irritants, particulates that obscure vision and toxic matter are replaced by clean fresh outside air. It has been shown that ventilation requirements for human occupancy is a function of the space per person and the activity[8,9]. Data from the references and other sources have been presented in a readily usable form in Fig. 5. The data of Activity Curve D of the figure, has been found to apply reasonably well to densely populated heavy smoke laden atmospheres as at sports arenas where vision and irritation are more of a problem than odor. It has been determined that 30 cfm per person provided effective commercial ventilation for such arenas, to avoid objectionable eye irritation, odors and impaired visibility[10]. For unusual or special problems, ventilation rates provided by regulations, The Guide[13] or local codes[14] should be considered as applicable.

The actual oxygen requirement per person varies with activity. It is normally about 0.89 cu ft per man hour when walking at the rate of 1 mile per hour. About 0.74 cu ft of carbon dioxide is liberated per man hour for normal activity. Normal air contains about 0.03 percent carbon dioxide. Fig. 6 shows the effect of carbon dioxide on lung action. A concentration of 0.6 percent has little effect on lung action, increasing it only about 10 percent above normal[9].

As is shown in Fig. 5, the oxygen and carbon dioxide requirements can be met with a fresh air ventilation rate less than 4 cfm per person. A fresh air ventilation rate above 4 cfm is required to dilute odors, irritants, smoke density, (visibility), or other non-toxic conditions. The amount of ventilation required per person to remove odors or dilute them to an acceptable value, Class 2, can be determined directly from the Activity Curve D of Fig. 5 for the space occupancy. The utilization of this curve is very effective for limited fresh air ventilation, such as exists

in block houses, control centers and protective shelters.

Smoke and other solid and liquid particulates can be effectively removed by electronic precipitators or absolute filters. A filter of the desired performance is a requisite for most all ventilation systems. Odors, gases and vapors can effectively be removed by charcoal adsorbers or by counteraction. In cases where the room is conditioned during summer or winter, considerable fuel and power saving can usually result by use of these methods, rather than by high ventilation rates[11], as will be subsequently shown.

Charcoal Adsorption

Charcoal adsorption is defined as the physical condensation of the sorbate, gas or vapor, on the sorbent, charcoal. The charcoal or carbon is especially prepared from coconut shells, peach kernels or other materials. To increase the surface area and thereby increase the sorption capacity, the charcoal or carbon is activated. The preparation of activated charcoal usually involves two steps. First, is the carbonization of the raw material by controlled heating in a neutral atmosphere. The second, is a high temperature oxidizing process, the purpose of which is clear from the multitudinous capillaries of the raw material, substances which cannot be carbonized and thereby create extensive surfaces on which adsorption can take place[11].

Coconut charcoal properly prepared is considered the standard high quality material for air or gas purification in air conditioning systems. The quality of charcoal as an adsorber of gases is rated on the break through time when subjected to the standard Accelerated Chloropicrin Test. The capacity of charcoal to adsorb gases or vapors, varies with the gas or vapor. Some are readily adsorbed, while others are not. Improved adsorption for certain gases including some war gases can be obtained by impregnation of the charcoal with certain mineral salts[9].

The relative adsorption qualities of high quality 50 minute unimpregnated coconut shell charcoal some vapors are given by Barnebey[12]. The figures are based on the removal of the substance from dilute concentrations in air, as encountered in air recovery and conditioning systems. If the weight of the vapor to be adsorbed is known, then the quantity of charcoal required for the period under consideration can be obtained by use of Table 2 of Reference 12.

Activated charcoal has high adsorbent capacity for body odors, tobacco smoke and most odor-causing substances. One pound of charcoal takes up about 20 to 50 percent of its own weight. Activated charcoal cannot be satisfactorily used to remove carbon monoxide or carbon dioxide.

If analytical determination or knowledge of specific odor causing compounds and their amounts are not available, other means can be employed to determine the char-

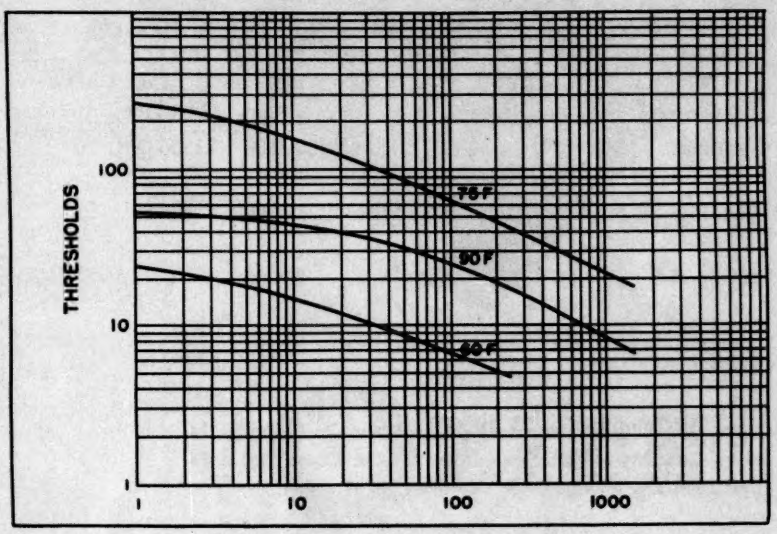

Fig. 4 Airing Time—Minutes (Nylon at 50 RH)

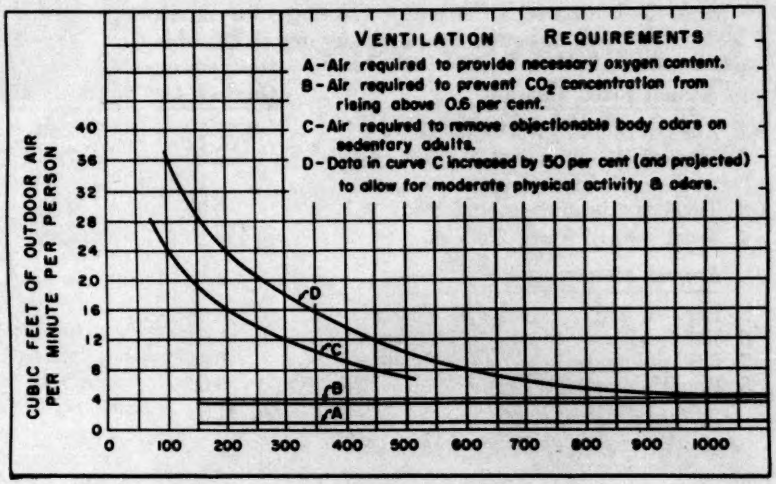

Fig. 5 Air Space In Cubic Feet Per Person

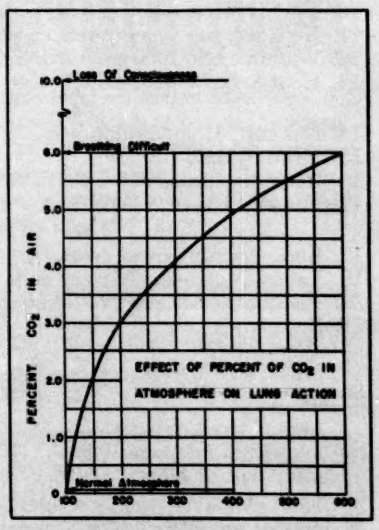
Loss Of Consciousness
Breathing Difficult
Normal Atmosphere
PERCENT CO_2 IN AIR
EFFECT OF PERCENT OF CO_2 IN ATMOSPHERE ON LUNG ACTION

Fig. 6 Percent Of Normal Lung Action

Table 2—Equipment Capacities and Costs per 1000 cfm

Air Equipment	Capacity Determination	Capacity	Unit Cost Dollars	Cost-Dollars Outdoor	Cost-Dollars Recovery
Cooling	$M = \frac{AH}{2667}$	3.8 Tons	300.00	1136.00	
Heating	$N = \frac{4.5\,AH_{max}}{1000}$	106.3 MBtu	4.00	426.00	
Recovery	A = Design basis	1000 cfm	350.00		350.00
Total First Costs				1562.00	350.00

M = Capacity in tons for outside air—Air Cons. Eng. p 14
N = Capacity in MBtu for outside air—Air Cons. Eng. p 14
Unit costs are for equipment installed, 1959 prices.

Table 3—Estimated Differential Owning and Operating Costs, Outdoor vs Recovery Air for 1000 cfm

	Outdoor Air	Recovery Air
Annual Fixed Charges		
1. Amortization, 20 yrs. Cost/20	$ 78.10	$17.50
2. Interest, 4% $\frac{20\text{ yr} + 1}{2 \times 20\text{ yr}} \times 4\% \times$ cost	32.00	7.35
3. Taxes and insurance (neglected)	0.00	0.00
4. Total Annual Fixed Charges	110.10	24.85
Annual Maintenance Costs		
5. Repairs, refrig. machy, $1.20/ton	4.56	
6. Refrigerant 0.44/ton	1.67	
7. Oil and grease 0.12/ton	0.46	
8. Repairs, heating gross	5.00	
	11.69	
Annual Service Costs		
9. Elec power, refrig. $\frac{0.746(hp)L}{e}$ = 3220 kwh		
10. Cost of electric power 1.5¢/kwh		
11. Refrigeration power costs (9) (10)	48.20	
12. Water at 11¢/1000 gal (neglected with cooling tower)		
13. Heat Requirement $\frac{4.5AH_{av}K}{e}$ = 165,000 MBtu		
14. Gas cost, $1.00/million Btu		
15. Heating cost, (13) (14)	165.00	
16. Recovery fan power, 0.0001573A × head = 0.063 hp		
17. Fan elec power, $\frac{0.746(16)(K + L)}{e}$ = 188 kwh		
18. Recovery fan power costs, (10) (17)		2.82
19. Labor to change recovery cells		2.00
20. Freight to ship used and recharged units		10.00
21. Regenerate recover cells		35.00
	213.20	49.82
Summary		
Annual fixed charges	110.10	24.85
Annual maintenance costs	11.69	
Annual service costs	213.20	49.82
Total annual owning and operating costs	334.99	74.67
Annual savings with air recovery		260.32
	$334.99	$334.99

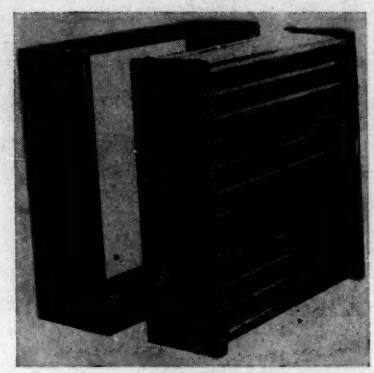

Fig. 7 Commercial Charcoal Filter, Accordian Type

coal requirements. These may be an inventory of individual odor sources, type of occupancy and volume to be purified, or dilution of purified air, using the curves of Fig. 5 or other means. For typical occupancies, one pound of 50 minute activated coconut shell charcoal will purify for one year 2000 cu. ft. in residences and barracks buildings, 800 cu. ft. in auditoriums, offices, or restaurants, 300, cu. ft. in hospitals, conference rooms or schools, and 100 cu. ft. of air raid shelters or animal rooms. If 40-min. charcoal is to be used, then the amount of charcoal required would be 20 percent greater.

Activated charcoal adsorption may also remove other gases present that are toxic or otherwise objectionable but might not have an odor. The physical removal of odors by activated charcoal is limited to air temperatures not over 125 F. Since usual objectionable odors are combustible and can be destroyed by burning, combustion processes are employed for odor destruction in higher temperature gases. Where it is desired to remove odors from industrial exhausts at temperatures above 125 F, the gases can be caused to flow over a catalyst at about 500 F and be destroyed by catalytic combustion. For higher temperature gases, direct combustion at temperatures of 1200 F and above are employed to destroy odors by passing through a furnace to the exhaust stack.

Activated charcoal is available in cylindrical canisters, flat plate or accordion pleated frames. They can be reactivated at a temperature of about 1000 F in some cases. The adsorbers are provided with a fan

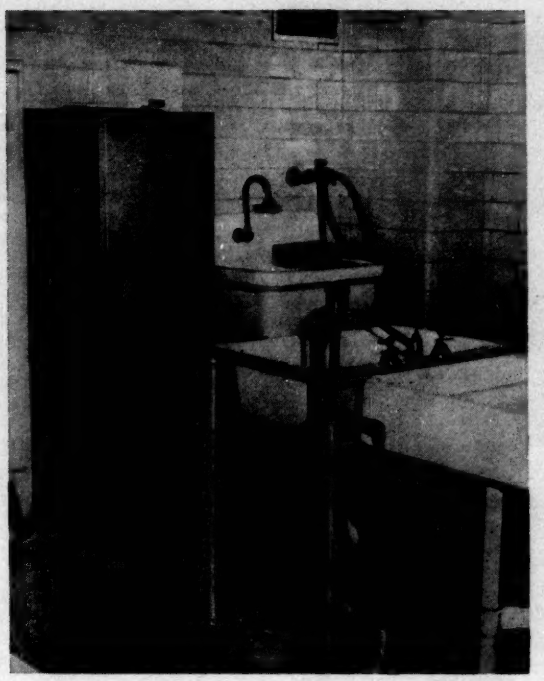

Fig. 10 Portable Odor Absorption Unit In Operating Room

system for recirculation or placed in the return air stream of an air conditioning system. If a percentage of the return air is purified, the fresh air requirement as indicated in Fig. 5 could be reduced accordingly, without affecting the odor level and with a saving in fresh air heating, cooling and blower costs. Four cubic feet of fresh air would still be required to supply oxygen and to prevent the carbon dioxide concentration from exceeding 0.6 percent. In cases where no fresh air can be provided, such as in a submarine or a protective shelter, oxygen can be provided and the carbon dioxide absorbed[9].

Ventilation vs Adsorption Economics

For a given building, the quantity of outside ventilation air supplied should be in accord with acceptable engineering standards[13], regulations and codes[14]. If the installation is to be operated summer and winter, hours of operation and outdoor and indoor design conditions must be known if the air is too cooled or heated. The Chicago Code not only specifies the total circulated ventilation air for various occupancies, but also stipulates that 1/3 of the code requirements shall be taken from out-of-doors where the space air temperature and dust content are controlled. It also stipulates that when effective adsorption devices are employed, not less than 15 percent of the code requirement shall be taken from the out-of-doors. This is very useful information to the designer in setting up an adequate ventilation system with or without the use of charcoal adsorbers.

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As an example of possible economies and comparative costs of outside air versus recovered air, 1000 cfm is considered as a basis, for a location having climatic conditions similar to Washington, D. C. Design conditions are given in Table 1, and investment or first costs in Table 2. Owning and operating costs are given in Table 3. Utility costs taken are those prevalent at many large installations. Equipment costs are current approximations. Owning and operating costs are based on Chapter 54 of the 1959 Heating, Ventilating and Air Conditioning Guide[13]. Basic formulas and explanations are given in the references[11,13,14,15]. Annual maintenance costs are based on the 1959 Guide, Chapter 54, Table 4, pg 729. The efficiencies, e, used in formulas of Item 9 and 13 were taken respectively as 70 and 75 percent. Summer cooling and winter heating has been considered.

The results of the economic study for the conditions indicate conclusively that it is more economical to recover a portion of the air in summer and winter than to provide all outside fresh air. This applies both to investment and operating costs.

For a prospective installation, the design engineer should make a comparable study as outlined herein using local costs of equipment and services and for the applicable climatic conditions and air quantities. Where the outside air is contaminated, it should also pass through the charcoal adsorber.

For installations of a special nature where air conditions cannot be economically improved by outside air ventilation or air recovery using activated charcoal, masking or counteraction may prove desirable. The manufacturer's representatives should be consulted for those applications, and the chemical constituents of the atmosphere determined. For applications at temperatures above 125 F, specialists on catalytic combustion should be consulted. Above 500 F, problems existing due to obnoxious flue gases may be solved by combustion, since most odorous gases are combustible. An economic study similar to that shown in the tables should be made for any system under consideration.

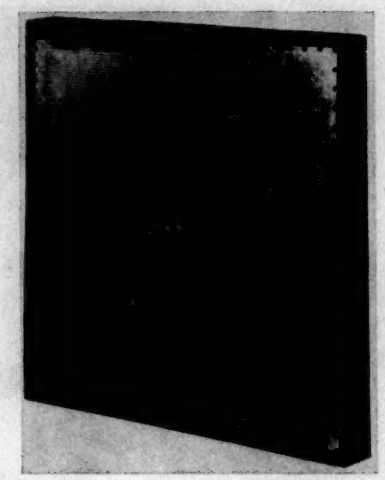

Fig. 8 Military Charcoal Filter

References

1 *Odors; Physiology and Control, by C. P. McCord and W. N. Witheridge, (McGraw-Hill Book Co., 1949).*

2 *A.S.H.A.E. Research Report No. 1524 —Ventilation Requirements for Cigarette Smoke, by C. P. Yaglou (A.S.H.-A.E. Transactions, Vol. 61, 1955, p. 25).*

3 *A.S.H.A.E. Research Report No. 1547 —Air Conditioning Coil Odors, by A. B. Hubbard, N. Deininger and F. Sullivan (A.S.H.A.E. Transactions, Vol. 61, 1955, p. 431).*

4 *A Method of Measuring the Odor Adsorption and Retention Properties of Surfaces, by W. F. Hopper, ASHRAE Journal, Vol. 1, No. 3, March 1959, p. 92. American Society Heating, Refrigerating and Air-Conditioning Engineers N.Y.*

5 *An information Theory of Olfaction by R. M. Hainer, A. G. Emslie and Ada Jacobson, Annals of the New York Academy of Sciences, Vol. 58, Art. 2, March 24, 1954, p. 161.*

6 *A.S.H.A.E. Research Report No. 1587 —Temperature and Humidity Effect on Odor Perception, by W. F. Kerka and C. M. Humphreys (A.S.H.A.E. Transactions Vol. 62, 1956, p. 531).*

7 *A.S.H.A.E. Research Report No. 1569 —Humidity Effects on the Odor Problem, by R. L. Kuehner (A.S.H.A.E. Transactions, Vol. 62, 1956, p. 249).*

8 *Your Place in the Smart Man's War, by G. W. Meek, Heating, Piping and Air Conditioning, Vol. 14, No. 8, Aug. 1942, p. 463.*

9 *Air Conditioning for Protective Shelters, by W. Viessman, Heating, Piping and Air Conditioning, Vol. 26, No. 12, Dec. 1954, p. 84.*

10 *A.S.H.V.E. Research Report No. 1277 —Tobacco Smoke Control—A Preliminary Study by O. S. Leopold (A.S.H.-V.E. Transactions, Vol. 51, 1945, p. 255).*

11 *Air Conservation Engineering, by H. Sleik and A. Turk, Connor Engineering Corp.*

12 *A.S.H.A.E. Research Report No. 1646-Activated Charcoal for Air Purification, by H. L. Barnebey, (A.S.H.A.E. Transactions Vol. 64, 1958, p. 481).*

13 *Heating, Ventilating and Air Conditioning Guide, 1959. American Society Heating, Air-Conditioning and Refrigerating Engineers, New York, N. Y.*

14 *Municipal Code of Chicago, relating to Ventilation, Chapter 81. Chicago Building News, 19 South Wells St., Chicago 6, Ill.*

15 *Economic Advantages of Clean Air, 2 parts. Honeywell, Minneapolis 8, Minn.*

Air Conditioning To Save Board Of Education $3000

»» AN investment in air conditioning will save the Board of Education in Alton, Ill. nearly $3,000 in operating costs this year, according to Dr. J. B. Johnson, superintendent of schools.

Dr. Johnson, a leading Midwest advocate of controlled thermal environment, said the air conditioning system installed in the Board's headquarters three years ago already has paid for itself and this summer will produce dividends in the form of savings on salary expenses. "Nearly $3,000 will be saved," he said.

Dr. Johnson pointed out that before the building was air conditioned the Board had to hire four extra employees during the summer to help the regular staff complete its work.

"The installation of summer cooling and dehumidifying equipment enabled our full-time staff of 10 people to work more efficiently and complete the necessary reports, budgets and teaching contracts on time without hiring extra girls," Dr. Johnson said.

This fall, Alton will have two air conditioned elementary schools. A complete cooling system has been installed in the 11-room Eunice Smith School which was built in 1958. The new Gilson Brown School, which opens this fall, was air conditioned at the time of construction. Cost of the new school was about the same as the Eunice Smith School, but it will provide two additional classrooms because it was designed around a system for climate control.

"We plan to air condition all our new buildings," Dr. Johnson said. "We are also considering equipping those constructed during the last decade. We have factual evidence that shows students and teachers work better in a controlled atmosphere."

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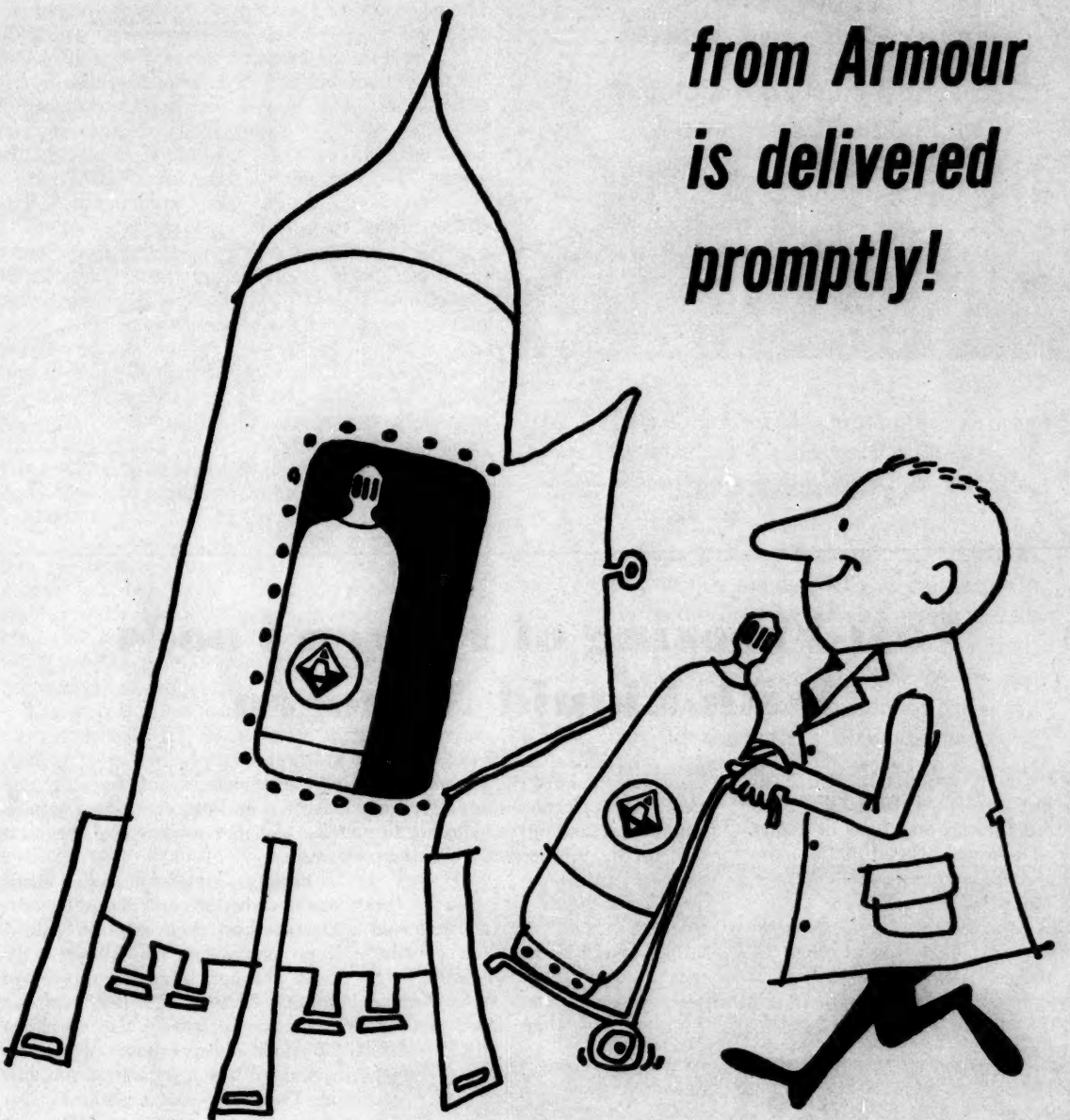

Late deliveries can cause trouble in the form of low head pressures and cooling room shutdowns. To avoid trouble many users resort to stockpiling extra cylinders.

But you can rely on prompt delivery from Armour, because wherever you are, there is one of Armour's 171 stock points nearby, ready to meet your ammonia needs quickly. This nationwide network of distribution points allows you to deal with one supplier, no matter where your plants are located.

For your added protection, every cylinder and tank truck of Armour Ammonia is subjected to a rigid qualitative test *after filling*. This extra test eliminates the danger of your receiving ammonia that has been contaminated during the filling process—assuring you of consistent, high purity on delivery.

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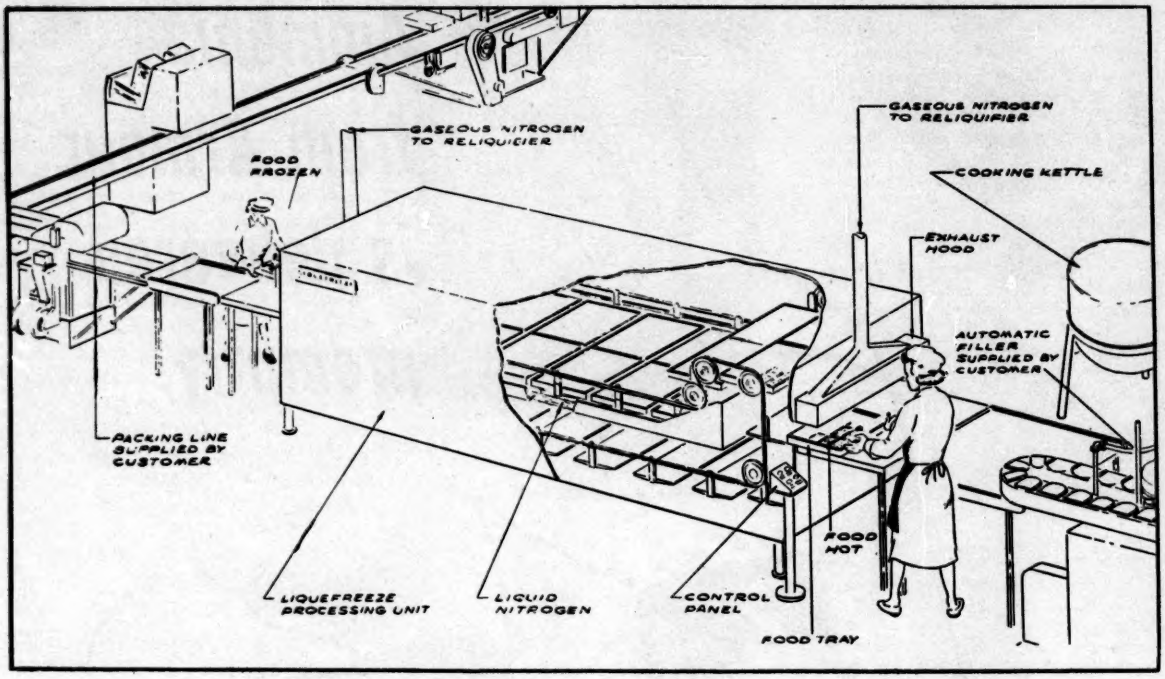

Fast Freezing of Frozen Foods With Liquid Nitrogen

»» ON A production line basis, in just one stage, foods are being frozen for the first time in a matter of minutes instead of the many step hour-consuming methods used heretofore!

This technological advance in the frozen food field was unveiled recently in demonstrations of the first Liquefreeze automatic production unit conducted at the Glendale, California plant of the Idaho Maryland Mines Corporation. This firm engineered and manufactured the unit for the Liquefreeze Company of New York.

Utilizing liquid nitrogen as the freezing agent, the new device brings foods down from cooking temperatures (160° to 180°F) to a completely frozen state (below 0°F) in less than five minutes! Present methods of freezing normally would require a varying number of hours to complete the same cycle.

Packages of cooked food, either open or sealed, are placed in wire baskets and then set into cradle-type conveyors which carry the food through a gentle shower of liquid nitrogen. The first exposure immediately freezes the top layer of food and prevents any subsequent spillage or erratic action during the initial stages of the immersion.

Moving from the shower area, the packages are immersed in a pool of liquid nitrogen at minus 320°F. As they pass from one end of the pool to the other, the packages become completely frozen. As they leave the unit, the food packages are ready for storage or shipping to distributors. In just a matter of minutes the process has

The output of this food freezing unit is reported to be equal to an average freezing plant of 15,000 square feet.

transformed the food from oven-hot to sub-zero freezer-cold.

The immersion period in the liquid nitrogen and the overall speed of the process can be regulated according to the type, size, and density of the food, in addition to the exit temperature desired.

Measuring 16′ x 8′ x 8′ this automatic unit requires only 128 square feet of floor space while most freezing methods would need up to 15,000 square feet of floor space to accomplish the same output. After demonstration this unit will be installed in a plant of a major Eastern food processor.

The process has been developed after several years of exhaustive research and testing by the Liquefreeze Company. Its development has been aimed primarily at finding an overall solution to most of the major problems which have plagued the frozen food industry during its thirty-year history. While this method is an entirely new concept for freezing and transporting food and not merely an improvement of existing freezing methods, the use of liquid nitrogen as a refrigerant is no longer just an interesting scientific phenomenon but a fully developed and proven commercial process.

Thousands of tons of frozen foods have been transported abroad in Liquefreeze containers during the past two years of both commercial and military shippers without a single mishap. Truck trailers and rail cars using Liquefreeze insulation, obviating the need of mechanical refrigeration or icing, are being used successfully in domestic transportation of frozen foods.

The process offers many immediate advantages to all segments of the frozen food industry. For example, taste—the ultimate measure of quality for any food product—is improved with the process. Exceptionally fast freezing truly locks in flavor and retains all the elements that distinguish freshly cooked foods from foods which must stand for hours before finally reaching a frozen state. Fast freezing also prevents any evaporation of water content in the foods and keeps them from becoming dry and flaky.

New Corporations Formed

Isbrandtsen Company, Inc. of New York and Idaho Maryland Industries Inc. of Glendale, California have concluded an agreement to form two new companies, Liquefreeze Corporation of America and Liquefreeze International, according to a joint announcement by Jakob Isbrandtsen, president of the Isbrandtsen Company and George J. Morton, president of Idaho Maryland Industries.

The new corporations will be engaged in the development and distribution of the Liquefreeze food freezing units and shipping containers which have brought new capabilities to both the frozen food processing and transportation fields.

All patent rights covering the Liquefreeze process and related applications of liquid nitrogen in the United States, Canada, Mexico, and Puerto Rico will be made available to the Liquefreeze Corporation of America. Overseas and South American operations will be handled by Liquefreeze International.

Six King Sharp Freeze units have been installed at Carnation's milk and ice cream processing plant in Seattle, Washington.

King systems feature fast, economical, simple air defrost . . . each unit is defrosted once or twice a week . . . 20 to 30 minutes defrosting time required. King Sharp Freezing Systems are designed to maintain maximum capacity during the entire interval between defrosting periods . . . thus no reduced capacity from heavily frosted coils.

7800 square foot hardening room has King Sharp Freeze units located on one side of the room with a specially designed air distribution system.

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cooling, ventilating and heating systems

New Products Designed to Improve Operation

R 11 Solvent In Small Cans

UCON brand Refrigerant 11 is being offered in a 25-pound can that simplifies the solvent use of this fluorocarbon in flushing air conditioning and refrigeration systems, according to Union Carbide Chemicals Company, Division of Union Carbide Corporation.

The orange color-coded can eliminates the need for handling heavy drums to withdraw small quantities of solvent. Waste and contamination of refrigerant are therefore avoided.

Another feature of the container is its telescoping nozzle for easier, faster pouring. Permanently attached to the can by a threaded collar, the nozzle may be raised or lowered as needed. An airtight insulated cap screws onto the threaded collar to prevent evaporation.

This can is re-usable, requires no deposit, and contains a handle for easy lifting and pouring. Loaded weight is only 28 pounds, including 25 pounds of UCON Refrigerant 11. This can is 10 inches high by 8-3/4 inches wide. Construction is of corrosion-resistant steel.

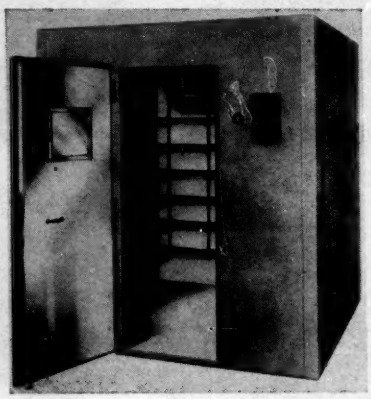
Carbide markets UCON Refrigerant 11 through wholesalers of air conditioning and refrigeration parts and supplies. Its exclusive sales agent is Ansul Chemical Company, Marinette, Wisconsin.

Walk-In Test Rooms

LABLINE, Inc. announces a completely new line of walk-in environmental rooms with two temperature ranges: ambient to 140° F and 0° to 140° F. Accuracy is maintained within plus-minus 1° F. The test rooms are constructed in convenient panel form, shipped knocked down to permit easy access through narrow doorways. They are quickly assembled.

All models have fully enclosed heating elements and come in a number of stock sizes. A unique feature of the Labline test room is the plenum chamber construction which eliminates all interior ducts and louvres.

The test rooms measure: 6 ft. x 6 ft., 6 ft. x 8 ft., 6 ft. x 10 ft., and 6 ft. x 12 ft. Inside working height is 7 feet. Other sizes can be made



to specific requirements. All models have a 12 inch x 12 inch Thermopane viewing window. They may be set in a corner or hallway, yet can be easily moved when necessary. Units are ideally suited for the preservation and storage of samples, for aging tests, specific gravity determinations, chromatography, conductivity tests and many other applications in the industrial, petroleum and petro-chemical fields.

The test rooms are constructed of heavy gauge aluminum inside with corrugated aluminum floor plates. Circline fluorescent lighting, lifetime-lubricated exhaust fans, etc. Shelving can be supplied in a variety of styles. Rounded cove moulding at base of exterior makes cleaning easy.

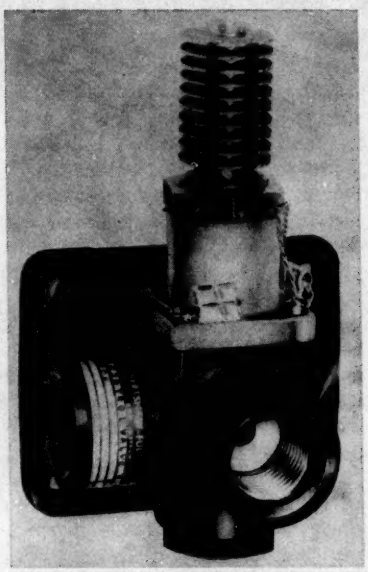
Control Valve Actuated By Air Temperature

A NEW flow-control valve for use in airborne heat exchangers, actuated by thermal energy only, has been developed by Robertshaw-Fulton's Aeronautical and Instrument Division.

The new valve, Model 1975, is operated by varying temperature which opens or closes a valve poppet to permit the flow of a coolant liquid such as anhydrous ammonia. The valve is available in both on-off and modulating types.

In use, the power element projects into the outlet of the heat exchanger. Increasing air temperature in the outlet duct opens the valve poppet, permitting the coolant to flow into the cooling coils. The nonelectric control eliminates a source of radio noise interference, and requires no additional system power drain.

Designed to operate at 90° ± 2°F., and adjustable between 80°F. and 100°F., the valve can handle inlet pressures between 20 and 550 psia



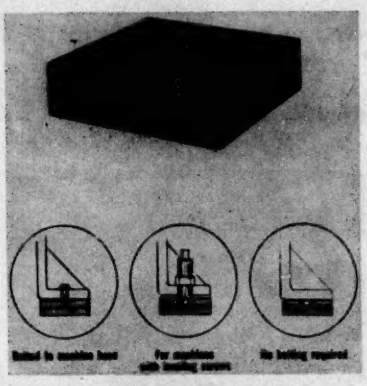
with no external leakage, and maximum internal leakage of 0.5 cc/hr. Maximum flow is 0.2 lbs./min. at 500 psi (NH_3) inlet pressure. Other pressure and flow rates are available.

Proof pressure of the unit is 1,000 psi, and burst pressure is 2,000 psi. Power elements are available for actuation temperatures ranging from 30°F. to 220°F. It is equipped with 3/8" T.S. ports, weighs 0.375 pounds, meets Mil-E-5272 procedure 1 vibration test requirements, and can be used at altitudes from sea level to 100,000 feet. Nonoperating temperature range of the valve extends from -65° to +160°F.

Machine Mount

A NEW machine mount using specially processed, high density fiberglass has been announced by Consolidated Kinetics Corporation. The Model N Kinetic Mounts isolate vibration and eliminate the need to lag-down machinery.

Guaranteed not to "creep", this new product permits mobile rather than permanently installed production machinery for the most efficient workflow, according to the company.



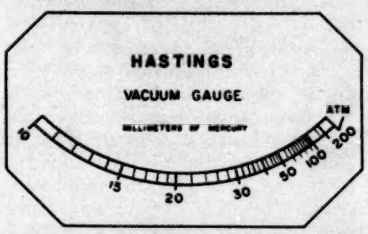
Kinetic Mounts utilize the extreme elasticity of the glass fibers, resulting in outstanding isolation efficiency plus high internal damping for machine stability. Elimination of chatter in precision machines caused by externally-excited vibration is now possible.

The Model N Kinetic Mounts are used where built-in level control is not required as illustrated. The Model L Kinetic Mounts are equipped with built-in level control.

Both models are available in three standard sizes to handle load ranges to 8,000 pounds per mount.

Vacuum Gauge

A VACUUM Gauge covering the range of 10-200 mm Hg absolute is now available from Hastings-Raydist, Inc., Hampton, Virginia.



Believed to be the first electrical vacuum gauge in this pressure range, the Model SP-3 offers accurate, direct reading pressure measurements unaffected by atmospheric pressure changes or exposure. The rugged Hastings thermopile is the sensing element. Freedom from outgassing, system contamination, corrosion and rust is assured by use of a noble metal thermopile and nickel plated tube.

Particularly well-suited to remote installations, the vacuum gauges are available in cabinet, panel, control and recorder type instruments.

The Hastings SP-3 series is designed particularly for applications such as power plant condensers, impregnation, vacuum drying, distillations and other processes requiring a rugged process instrument approaching laboratory accuracy. Operation is from 90-135 volts ac, 60 cycle line and utilizes the Hastings thermopile technique. Gauges are available with matched interchangeable gauge tubes. Multi-position models for monitoring up to 5 positions are also available.

Leak Detector

EXTREMELY small leaks of any compressed gas are easier to locate with Calgon Gas Leak Detector, a high-viscosity liquid which forms bubbles when daubed on pipe joints where leakage is suspected.

Leaving no deposit, harmless to skin, and non-staining, the liquid can be used with safety and without danger of fire. The new gas leak detector composition is non-freezing. It functions efficiently with any compressed gas—including air, CO_2, nitrogen, natural gas, and all refrigerant gases.

Packed in six-ounce unbreakable plastic bottles, Calgon Gas Leak Detector comes with a stainless steel dauber rod.

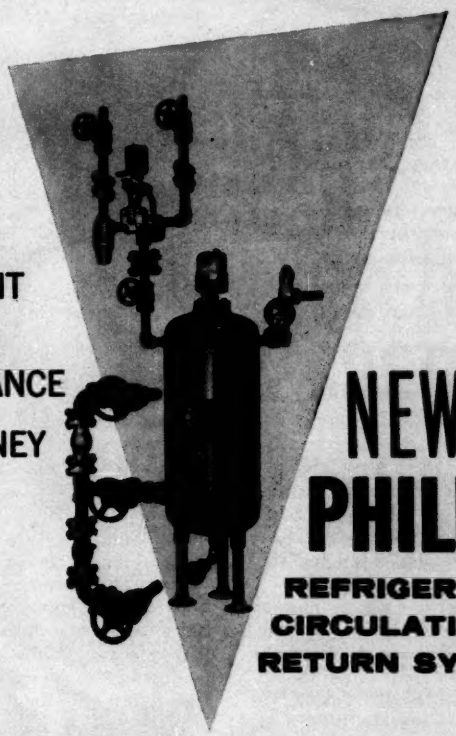
MORE EFFICIENT

SAFER

PROTECT EQUIPMENT

SIMPLIFY MAINTENANCE

SAVE MONEY



NEW PHILLIPS

REFRIGERATION CIRCULATING and RETURN SYSTEMS

• substantially reduce operating costs through—more efficient use of all components . . . complete protection of compressors, more efficient heat transfer, central liquid control . . . save operator time.

• adapt to existing plants with only minimum additional equipment—uses your present components to good advantage, nothing to tear out!

• adapt to new construction by simpler, more efficient system design—fewer components required!

• controlled low pressure is the secret that permits complete flexibility in the use of equipment—you can use automatic float controls or simple hand valves . . . facilitates hot gas defrosting as well as oil return, etc.—no high cost components needed!

. . . NOW

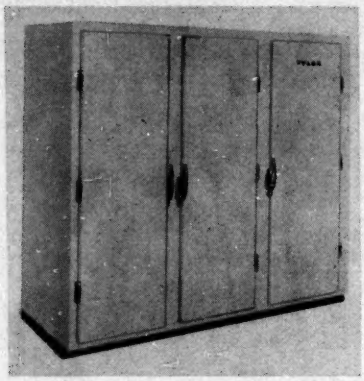
See your Phillips Representative or write for details

H. A. PHILLIPS & CO., 3255 W. Carroll Ave., Chicago 24, Ill.

DESIGNERS AND ENGINEERS/REFRIGERATION CONTROL SYSTEMS

New Products cont.

Storage Freezers



FRESH, clean, trimline styling, more net capacity in less floor space for space-saving compactness, lower operating and upkeep expenses highlight the all-new "Quality Line" Reach-In Refrigerators and Storage Freezers announced by the Tyler Refrigeration Corporation, Niles, Michigan.

Available in one, two and three door models, for self-contained or remote installation, the new Tyler models are offered in a choice of gleaming stainless steel or lustrous, baked on white enamel exteriors and interiors. Aluminum interiors are also available.

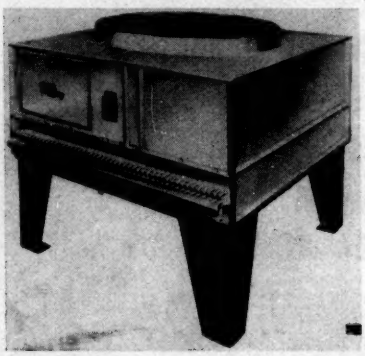
Net capacities of remote installation models are as follows: 21.5 cu. ft.; 43.0 cu. ft. and 67.3 cu. ft. Self-contained models: 16.75 cu. ft.; 38.2 cu. ft. and 62.5 cu. ft.

Reach-In Refrigerator interiors come furnished with four copper nickel, chrome-plated wire shelves per full length cavity and three shelves per three-quarter-length cavity, as standard. At customer's option, chrome-plated pan slides to accommodate 18" x 26" pans may be substituted for wire shelves at no extra charge.

Among the many features built into the new Tyler Reach-In Refrigerator line are: all-metal interior door liners; exterior-mounted, heavy-duty hardware; welded-steel construction; conveniently-located thermostatically-controlled temperature control; super-density insulation; efficient drainage system; perforated base, etc.

Air Cooled Condensers

A COMPLETE range of air cooled condensers—8 to 85 tons in a single unit—for all air conditioning and refrigeration applications is now available from McQuay, Inc., Minneapolis manufacturers of air conditioning,



heating and refrigeration equipment. Thirteen sizes of horizontal and vertical air flow Aircons for all engineering requirements are available with unlimited capacity in multiple unit installations.

Rigid, heavy gauge continuous galvanized steel construction makes the units quiet in operation. The "Seasontrols", automatic head pressure controls, are available as accessories, and modulate the condenser capacity in accordance with the weather for proper operation at all times. Complete specification information is available upon request to McQuay, Inc.

Graphite Spray Lubricant

TOP efficiency because of the even dispersion gained through aerosol application is reported for Sprayon No. 204 Dry Graphite Lubricant

made by Industrial Supply Division, Sprayon Products, Inc. Packed in a 12-oz. self-spraying can, the graphite is part of Sprayon's line of 47 maintenance and production aids in aerosol containers.

Made of a high-quality synthetic graphite and specially formulated for aerosol use, Sprayon No. 204 Spray is recommended wherever a "dry" lubricant is indicated, where petroleum products must be avoided, where temperatures are extreme.

Air Defrost Blast Freezer Line

THE Vilter Manufacturing Company, Milwaukee, Wisconsin manufacturer of commercial refrigeration and air conditioning equipment has announced the introduction of a line of air defrost blast freezers for such low temperature applications as ice cream hardening and meat, fish and poultry storage rooms.

Extreme versatility of application is made possible by offering eight sizes ranging from 6300 cfm through 36,000 cfm. Vertical and horizontal air discharge models are available in

DOLE
Heat-Cel
LOW TEMPERATURE
AUTOMATIC
DEFROST
RE-EVAPORATOR UNIT
ELECTRIC
FAST HEAT TRANSFER FOR QUICKER DEFROSTING!
Heat for re-evaporation supplied by low wattage electrical element. Consistent, economical, performs in any ambient. Designed by specialists in the low temperature field. Get all the facts. Write for Heat-Cel engineering catalog.
DOLE REFRIGERATING COMPANY
5938 NORTH PULASKI ROAD, CHICAGO 46, ILLINOIS
103 PARK AVENUE, NEW YORK 17, N.Y.
DOLE REFRIGERATING PRODUCTS LIMITED
OAKVILLE, ONTARIO, CANADA
Heat-Cel
CONVENIENT PLATE DESIGN
ALLOWS FLAT-AGAINST-WALL MOUNTING

each size to enable the equipment to be installed in any location where warm air is available to defrost the fin coils.

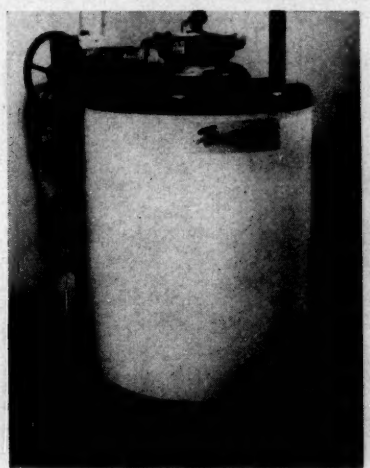
Air can be distributed into the cold room through duct work with directional flow or induction type outlets or it can be distributed through a perforated false ceiling.

Other features include liberal fin coil surface and simplified, rapid defrosting. Since the coils can be so easily defrosted, more efficient heat transfer is possible and compressor operating time is held to a minimum.

These new air defrost blast freezers supplement Vilter's previously introduced water and hot gas defrost units to enable the proper quick freezing equipment to be selected for each specific installation.

North Star Moves To New Plant

»» NORTH Star Automatic Ice Equipment Company recently moved into its newly completed 3-level addition, 15th Avenue Northwest and Shilshole, Seattle, Washington. The new modern $100,000 addition will greatly increase the firms production capacity in manufacturing automatic ice machines and ice handling equipment.



North Star pioneered its ice machine many years ago in supplying ice to the large fishing fleet of the Pacific Northwest. So successful was their ice maker and so high was the quality and lasting characteristics of their ice that they were soon building machines for others.

Today, North Star Automatic Ice Machines are as far north as the Arctic Circle, and are also found throughout Canada and the United States and throughout the world in Newfoundland, New Zealand, Brazil, Honduras, Korea, Mexico and Pakistan. The machines serve the dairy, meat packing, chemical, fish and poultry industries. Contractors also use them in building of dams and other structures that require large pours of concrete that must be cooled to cure properly.

The machines are available in models to fill any requirements from 3 to 300 tons of ultra-cold ice daily.

Air Conditioner Bulletin

»» DUNHAM-BUSH, Inc., West Hartford, Connecticut manufacturer of air conditioning, heating, refrigeration and heat transfer products has issued a new bulletin on its packaged air conditioner line. The twelve page bulletin includes product details and technical data. A cutaway illustration makes for quick visual analysis of fan section, panels, filters, cooling coils, drain pan, electrical controls, condensers, (water and air cooled), refrigerant drier/strainer, liquid sight glass, receivers, refrigerant charge, compressors and cabinet. Other sections include: accessories, capacity specifications, dimensional data, specifications, ratings, piping diagrams, wiring diagrams and warranty statement.

Copies of the bulletin are available on request for bulletin 6022 from Dunham-Bush, Inc., 179 South Street, West Hartford, Conn.

CHILLED BY HIGH FREEZING COSTS?

3521 CONTACT KOHLENBERGER!

You'll warm to industrial refrigeration economically designed and manufactured by Kohlenberger. Here's *complete* service covering every aspect of your refrigeration needs...from equipment manufacture and system design to plant layout and field erection. Since 1922 Kohlenberger Engineering Corporation has built its reputation on the skill of its engineers... the dependability of its equipment. We'd like to show you how you'll benefit. Write for literature or phone LAmbert 5-3521.

1. KMV Compressor: 20-200 HP. Heavy duty, high speed industrial refrigeration compressor units for ammonia and freon refrigerants.

2. KE Condenser: Heavy duty industrial evaporative condenser. 10-200 tons.

3. Krahico Maker: 10-60 ton ice capacity per unit. For every crushed ice requirement.

4. Unit Cooler: Industrial floor-type unit cooler for ammonia, freon and brine refrigerants. 5-30 tons.

Franchises available for qualified industrial refrigeration contractors. Contact C. R. Kohlenberger, president.

KOHLENBERGER ENGINEERING CORPORATION

1600 COMMONWEALTH AVE., P.O. BOX 432, FULLERTON, CALIFORNIA

8 Ways To Kill Your Industrial Hose

>>> WOULD you:
Beat or cut a hose to unclog it?
Run steam through a hose designed to carry water?
Bend a hose back and forth repeatedly to loosen it and make it more flexible?

Maybe you wouldn't, but apparently some people in industry do.

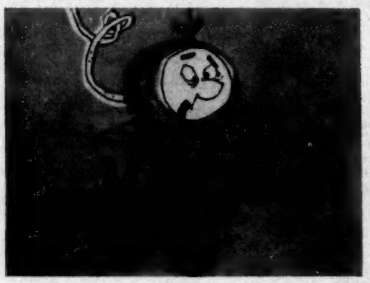
A recent study of the nature and causes of industrial hose replacements, indicates that such antics are responsible for at least 60 percent of these premature hose failures, according to Jack Quamme of Dayton Industrial Products Company, Division of the Dayco Corp.

The cause—obviously—is plain carelessness. And combatting carelessness is a difficult chore. But rather than give stern lectures and issue dire warnings, Dayton Industrial has taken the opposite approach and is producing an easy-to-follow booklet called "8 Ways To Kill (Or Keep) Your Industrial Hose"—here summarized because of its general interest.

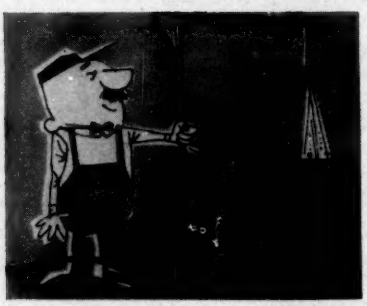
Mr. Quamme said today's quality industrial hose is far superior to the so-called quality hose produced a few years ago. "Carefully engineered and tested, today's hose is designed to take rough handling and withstand abuse," he said. "But they aren't designed to take excessive neglect that users are apt to give them."

"Perhaps," Mr. Quamme says, "by pointing out how easy it is to damage hose through carelessness, we'll help the human errors that cost industry thousands of dollars a year, and we'll help users get longer life and more for their hose dollar."

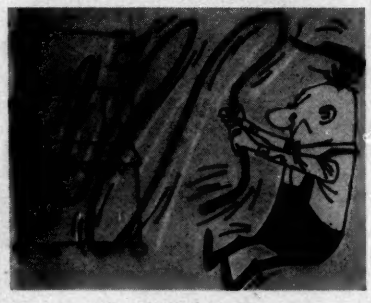
If you want your hose to die before its time, follow these simple directions:



1—SELECT THE WRONG HOSE FOR THE JOB—This way you won't have to use it very long because chances are it—or you—won't last long.

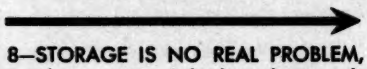


2—BEND THE HOSE SHARPLY TO MAKE IT LOOSE. This does a lot to destroy the reinforcement member and makes the hose easier to handle. Bending it at right angles will help, too. Don't let leaks and blowouts rattle you, because you can always buy more hose.



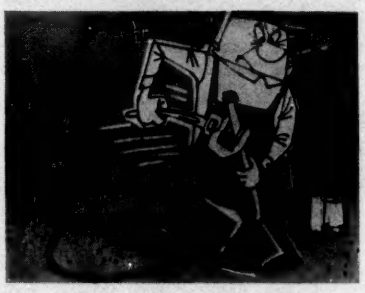
3—YANK AND JERK THE HOSE, especially if it's hung up on a piece of machinery or is kinked. You can flatten it by driving over it, too. This will certainly make it more pliable, and may make it air conditioned.

4—EXCEED THE RECOMMENDED WORKING PRESSURE. Sure, you can always push more through the hose this way. (But look out!)



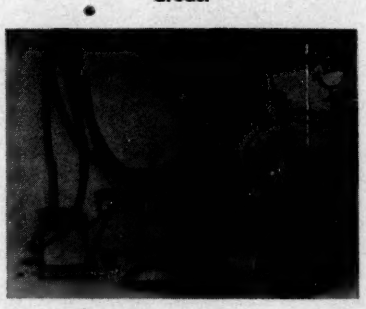
8—STORAGE IS NO REAL PROBLEM, just leave it. Don't bother about reels or racks, or the sun, acid or the elements. Hang it on a nail or hoop. These are sure to grab into the hose and hold it firmly.

5—DRAG THE HOSE EVERYWHERE, don't bother to help it over rough surfaces and sharp rocks. Glass, dirt and grime . . . these will really put your hose in shape.



6—STICK THE FREE ENDS IN DIRT TO STOP THE FLOW, and forget to check and clean the fittings. It'll help if you douse the couplings in oil and grease. It's not necessary to wash them in soap and water as the manufacturer recommends. (Not much, it isn't.)

7—DON'T CLEAN THE HOSE after it's been used. If it gets clogged insert sticks and sharp objects inside to clean out the debris. If the hose protests, beat it with a sledge hammer. This is guaranteed to loosen up the clogged areas.



Orton Joins General Controls

William S. Orton, registered mechanical engineer in California, has been named field representative for General Controls Co.'s Air Conditioning-Refrigeration Controls Div. His headquarters will be in the firm's San Francisco branch office, 600 Bryant St.

Before joining General Controls, Orton was sales engineer for Fabricated Metals Co., San Leandro, Calif. He was also formerly president of Nels H. Rosberg Inc. of San Francisco.

The new field representative is a member of the American Society of Heating, Refrigerating and Air Conditioning Engineers; the Society of American Military Engineers; and a charter member of the American Society of Refrigeration Engineers. He is also a member and past president (1948) of the National Association of Practical Refrigerating Engineers.

In his new capacity, Orton will handle sales and service in the Northern California area for the division.

General Controls Co., headquartered here at 801 Allen Ave., is one of America's leading producers of automatic controls for residential, commercial, industrial and military applications.

Trane To Expand Clarksville Plant

»» THE Trane Company, La Crosse, Wisconsin, plans the construction of a 120,000 square foot addition to its manufacturing plant at Clarksville, Tennessee, President D. C. Minard announced. The addition, with new manufacturing equipment, will represent an estimated cost of about $1,200,000. It is scheduled for completion next February.

With the addition, the total square footage of the plant will be more than 270,000 square feet, an increase of about 80 per cent over the present plant area. Production capacity of the plant will be nearly doubled.

The Clarksville plant was built in 1958 for the manufacture of Trane Residential and Commercial Self-Contained Air Conditioning Units and Heat Pumps. Since it began operation about 2½ years ago, it has grown to utilize its full capacity in 1960. Sales have increased considerably.

The new plant addition will comprise about 115,000 square feet of manufacturing and storage space and 5,000 square feet of office space and lunch area.

Accelerated poultry chilling tests reported by USDA

»» SPEEDING up poultry chilling by agitation of chill water or other means does not change the normal tenderization rate, according to a USDA report.

Studies with fryer chickens and fryer-roaster turkeys, conducted by A. A. Klose and co-workers in the Department's laboratory in Albany, Calif. indicate that fast-chilled birds should have the same aging above freezing as slowly chilled birds.

In these experiments, periods as short as 30 minutes were adequate for complete chilling in agitated (tumbling) ice water. Klose and coworkers found however that the process of tenderization is not related in any manner to rate of chilling.

The research results indicate that fast chilling is an acceptable practice when adequate aging is taken into account. Yield of cooked meat, calculated as percentage of weight after evisceration, washing, and draining but before chilling, was not affected by accelerated chilling.

The "King Zeero" Ice Building and Cooling System

* No Moving Parts * No Mechanical Agitation * Negligible Maintenance

"King Zeero" NEW Combination
PURE WATER COOLER and ICE BUILDER
Front View

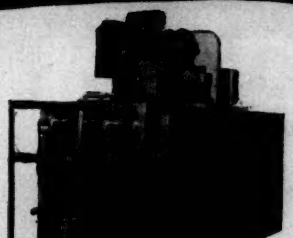
For INGREDIENT and WASH WATER APPLICATIONS
Provides a Clear Odorless, Palatable, Filtered Cold Water Supply

Patented Built-In Louvers provide Automatic Agitation without extra power

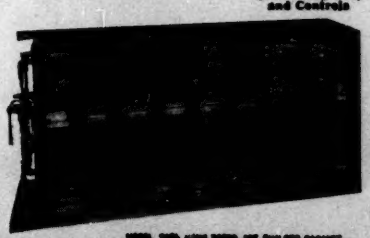
Stored Ice and Direct Expansion furnish 32°-34° circulating water for all product cooling needs.

Remember, the "King ZEERO" delivers the COLDEST water LONGER for less outlay.

THE KING ZEERO May also be used with an AIR CONDITIONING UNIT



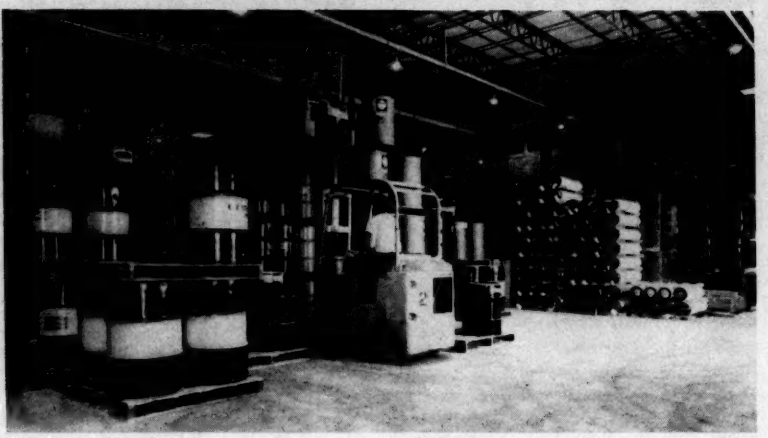
MODEL 660A
KING ZEERO
Ice Builder Cabinet
With 7½ H.P. Freon Condensing Unit and Controls



THE KING ZEERO COMPANY
4300-14 W Montrose Ave.
Chicago 41, Ill.

Manufacturers of Ice Builders - Ice Builder Cabinets - Ice Banks - Pure Water Coolers

New Chemical Specialties Plant To Serve Southeast Put Into Production By Pennsalt Chemicals



»»» PRODUCTION and distribution of a diversified line of chemical specialties products has begun by Pennsalt Chemicals Corporation at a new 34,000 square-foot plant just completed in Atlanta, Georgia. The fourth modern blending, warehousing and distribution center designed and constructed by Pennsalt since 1955, the new plant will serve the Southeast with Pennsalt's full line of products for such major industries as food, dairy, metal processing, laundry, dry cleaning, refrigeration, and aerosol packaging.

The new plant will also distribute the company's line of household products. Its facilities will include packaging and distribution facilities for the full line of Isotron refrigerants and aerosol propellents.

Pennsalt B-K cleaners and sanitizers for the food and dairy industries, which will be made and warehoused, have been widely used in the Southeast for many years. The company's line of chemicals for swimming pools will serve the popular home pool markets.

Metal producers and fabricators in the Southeast will be served by a complete line of phosphatizing, cleaning and drawing lubricants as well as Pennsalt's metal processing machinery and technical service through this new location. Like all other industries which the plant will serve, commercial laundries and dry cleaning establishments in this region will get more direct service on an already widely-used line of Pennsalt products.

Located on a ten-acre tract in College Park adjacent to the new expressway on the southern perimeter of Atlanta, the new plant is the most modern of seven Pennsalt Chemical Specialties Division plants in the United States and Canada. Its modern layout includes both interior and exterior materials storage and manufacturing facilities. Exterior explosion-proof production equipment will make such products as Delchem cleaners and coatings for the aircraft industry. The production area of the interior features a large mezzanine equipped with the latest machinery for wet and dry blending and utilizes efficient gravity feeds for packaging. This feature, used successfully at other Pennsalt Chemical Specialties plants, makes possible single floor operation and closer contact between production, administration and shipping.

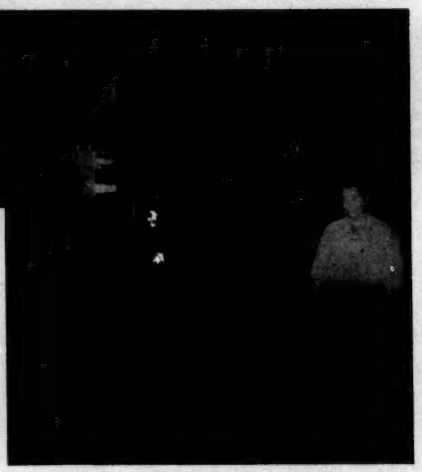
The plant is near every type of transportation for fast movement of goods and personnel. It is located on the Central of Georgia Railroad, is near the Atlanta Airport, and has access to the new expressway within a quarter mile. In addition, the new plant is located in a booming industrial park which includes customers for Pennsalt chemical specialties.

In addition to its strategic location for serving a variety of industries in the Southeast, the plant's administrative offices will include billing, accounting, and credit functions for fast customer service.

Welding Piping

»»» Basic information concerning arc welding techniques for small diameter piping is contained in Lincoln Electric Company's Bulletin 2112.3 called "Arc Welding Small Diameter, Non-Critical Piping". The Bulletin lists the advantages of welded piping installations; describes pipe welding procedures.

THE ULTIMATE IN THE COMPRESSION REFRIGERATION CYCLE*



THIS IS ANOTHER CYCLE CENTER, factory assembled and on its way to a 150 ton poultry freezing plant.

What will it do?*

It will provide liquid overfeed to the evaporators, catch the excess liquid and recirculate it to the evaporators, with these results:

- FULL COMPRESSOR PROTECTION AGAINST SLUGS
- PEAK COIL AND COMPRESSOR EFFICIENCIES
- SUB COOLED LIQUID FEED AT CONSTANT PRESSURE THE YEAR AROUND
- PRACTICALLY UNLIMITED RATE OF LIQUID FEED AT ABSOLUTELY NO POWER COST
- NO MECHANICAL PUMPS
- NO FLASH GAS IN LIQUID LINES
- SAFE, AUTOMATIC PLANT OPERATION
- OIL SEPARATION, ANY REFRIGERANT
- HIGHER SUCTION PRESSURES
- LARGE POWER SAVINGS
- LARGE SAVINGS IN FIRST COST ON NEW PLANTS. FOR EXAMPLE, THE RECEIVER IS NOT REQUIRED AND SURGE DRUMS ARE ELIMINATED.
- AUTOMATIC HOT GAS DEFROSTING AT MINIMUM COST

ASK FOR BULLETIN CC-2

*** NOT JUST A LIQUID RETURN UNIT.** Available for any refrigerant, in capacities from 10 to 1,000 tons and more. Factory assembly is optional.

J. E. Watkins Co.
307 LAKE STREET, MAYWOOD, ILLINOIS

Diversified Bill of Fare For Fleet Maintenance Exposition

»» ALL phases of maintenance and service needed to keep a motor vehicle fleet rolling will be featured at the 1960 Fleet Maintenance Exposition to be held in New York's Coliseum, December 5-8, 1960.

Sponsored by the Private Truck Council of America, Inc., the Fleet Maintenance Exposition is the association's first endeavor to place under one roof, key management and maintenance executives, together with manufacturers of parts, vehicles, lubricants, and fuels, shop equipment and maintenance devices.

The Exposition is planned exclusively to meet the needs of the executives of the country's truck, bus and automobile fleets. It will provide top level officials with an opportunity to see first-hand and compare the relative merits of the new developments in the fleet maintenance field. While observing and expanding the products, the registrants will also have an opportunity to talk, person to person, with the engineers and service representatives who designed and built the new products.

The new facts, new ideas and new methods that will be available at this Exposition are all beamed toward assisting the fleet owner in improving and economizing his maintenance operation.

In addition to the exhibits, the 1960 Fleet Maintenance Exposition will feature Workshop Seminars, discussing such topics as 'Shop Maintenance Techniques," "Records and Accounting Procedures," "Deferred Maintenance."

E. I. DuPont de Nemours, Budd Company and Engler Instrument Company are the latest exhibitors to join the growing list of leading manufacturers who are reserving space for the Exposition.

Other leading manufacturers who have already reserved exhibit space include: Bendix-Westinghouse, Automotive Air Brake Co., Champion Spark Plug Company, Delco-Remy Division, Shell Oil Co., Timken Roller Bearing Company, Minnesota Mining and Manufacturing Co., Aeroquip Corp., Baird Dynamic, Chicago Rawhide Mfg. Co., Argo Instrument, Aro Equipment Corp., Bostrom Corp., Everhot Mfg. Co., Michelin Tire Co., Stanley Publishing Co., The Service Recorder Co., Tyrex, Inc. and Wagner Electric Corporation.

Exhibit space will be allotted the latter part of July. Meantime space applications are being received daily.

Air-Conditioning Exposition Will Be The Largest Ever

»» THE largest display of heating, ventilating, air conditioning and refrigerating equipment ever held is assured for the 15th International Heating & Air-Conditioning Exposition at the International Amphitheatre, Chicago, February 13 to 16, 1961. An unprecedented early demand for space confirms forecasts that the forthcoming biennial event will surpass even the record-breaking air-conditioning show of 1957.

Mounting interest in heating and air conditioning throughout the world promises an increased attendance and response to the Exposition's continued expansion. Industrial, institutional, commercial and residential equipment reflect community needs and desires wherever their capabilities are understood.

The expansion of the Exposition over the years and recognition of its function as the common market for a great community of industries is supported by many new exhibitors from other fields, bringing new products and special skills.

BIG LITTLE OR IN-BETWEEN

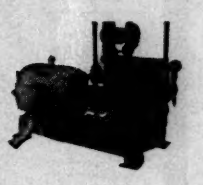
Creamery Package Engineering Means Lower Cost Refrigeration

Any job—for any temperature
60° below to 40° above

This assurance is backed by three generations of CP refrigeration know-how, advancement and *continuous user preference*. See Your CP Refrigeration Representative about your needs.

CP Type "K" Booster Compressors 4, 6 and 10 cyl. models, cap.* from 10 to 120 tons.

CP "VS" Compressors 2- 4- and 6-cyl. models in cap.* from 2 to 30 tons.



CP Type "K" Ammonia Compressors 4 and 6 cyl. models, cap.* from 10 to 200 tons.

*Depending on suction pressure.

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General and Export Offices:
1243 W. Washington Blvd., Chicago 7, Ill.
Branches in 23 Principal Cities

Creamery Package Mfg. Co. of Canada, Ltd. 367 King Street, West, Toronto 2B, Ontario

New trends are also developing. As the air conditioning of ultra modern office buildings, hotels and high class apartments approaches the ideal of comfort service, manufacturers of more popular equipment are raising performance standards and offering a wider selection of units.

As heretofore, the Exposition will include a comprehensive array of materials, components and supplies.

For industry at large it will offer not only heating, ventilating, refrigerating and air-conditioning equipment, but many products serving kindred purposes. Among them will be pumps, fans, blowers, compressors, motors and controls. Steam and hot water boilers will be offered for process services, as well as for space heating. There will be displays of insulation and air filtration, heating and cooling coils, cooling towers, refrigeration equipment and a variety of specialties in the field of nstrumentation.

The Exposition will again be held under the auspices of the American Society of Heating, Refrigerating and Air-Conditioning Engineers in conjunction with its concurrent national meeting.

As heretofore it will be under the management of the International Exposition Company, 480 Lexington Avenue, New York 17, N. Y. The manager of the Exposition is E. K. Stevens.

Noland and Britton Project Engineers at Kohlenberger

»» APPOINTMENT of Joseph T. Noland and Robert E. Britton as project engineers at Kohlenberger Engineering Co., of Fullerton, Calif., has been announced by C. R. Kohlenberger, president of the Orange County, Southern California industrial refrigeration equipment manufacturer.

J. T. Noland

R. E. Britton

Noland was formerly sales engineer at Five Point Engineering Corp., of Los Angeles, Calif., Riverside Division of Food Machinery & Chemical Corp., Riverside, Calif., and A. J. Bayer Co., of Los Angeles. Britton has been associated with Weidenfeller Engineering Co., Grand Rapids, Mich., as a sales engineer.

Their responsibilities at Kohlenberger include original sales contact work, customer follow-through, design of installations, supervision of installation construction, testing of completed installation and periodic inspection of completed installations.

Both men will be based at the Kohlenberger offices in Fullerton.

New Literature On Centrifugal Fans

»» A NEW 60-page bulletin (No. A-1103) describing the new American-Standard Series 116 centrifugal type airfoil bladed fans is now available from American-Standard Industrial Division, Detroit 32, Michigan.

The bulletin discusses features of the new fans and lists suggested applications. American-Standard construction for Class I, Class II and Class III airfoil bladed fans is described and illustrated. The new low velocity radial rim wheel design is discussed in detail. Cutaway illustrations showing Series 116 wheel construction and two types of blade construction are included. Standard and

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AMMONIA VALVES AND ACCESSORIES
Now available in a complete size range—flanged globe and angle valves with forged steel flanges in F. P. T., socket-weld and welding neck types. Other Henry products include globe and angle shut-off valves; ASME approved relief valves; dual relief valve assemblies; forged steel flanges, unions and fittings.
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BASIC REFRIGERATION
By Guy R. King
The Book
of
"Refrigeration Knowledge"

29 Chapters—340 ILLUSTRATIONS—526 PAGES
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Fundamentals
Compression System of Refrigeration
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Brine in Refrigeration
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Carbon Dioxide—Dry Ice
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Absorption Systems
The Refrigeration Code

Send For This Book—$6.00
NICKERSON & COLLINS CO.
433 N. Waller Ave., Chicago 44.

alternate bearings for the three fan classes in AMCA standard arrangements are also described and illustrated.

An illustrated discussion of modifications which adapt the Series 116 airfoil bladed fans to meet specifications for a wide variety of application conditions is also included. Another section in Bulletin A-1103 on methods of volume control compares outlet dampers, variable inlet vanes, slip ring motor and Gyrol fluid drive in terms of effectiveness, power requirements and cost.

Thirty pages of capacity tables for standard air conditions are given, covering the full line of 15 sizes in both single-inlet and double-inlet construction. The tables list values for each size with static pressures from 1/4 to 11-1/2-in. water gauge. In a section preceding the tabular data, a step-by-step procedure and an example problem are given for variations from standard conditions. Problem solutions are provided for both the "cold static" method and the "constant pressure" method.

Outline type installation drawings are provided to convey basic dimensional data for all sizes and arrangements. Dimensions for fans equipped with inlet vanes are also presented.

A typical specification for ordering airfoil bladed fans is also included as a guide to engineers, architects and buyers.

Howard Refrigerator Co. Building New Plant

»» HOWARD Refrigerator Co., Inc., will build a new one story plant on six acres of ground at the northeast corner of Grant Ave. and New Blue Grass Road, it was announced today by the Philadelphia Industrial Development Corp., which negotiated the transaction with the company.

Howard, a manufacturer of commercial and industrial refrigeration whose products are shipped throughout the world, plans to consolidate operations now carried on at two other Philadelphia locations in the new facility. The company expects to increase its present work force from 100 employees to 250 during its first three years in the new plant.

Construction of the new plant will begin immediately, and Howard will occupy it before the end of the year, Albert Fogel, president of the company said today. The project will comprise 100,000 square feet of manufacturing, office and loading facilities. This will ultimately be expanded on a portion of the remaining acreage.

The plant site is part of a tract of surplus city-owned land near the Philadelphia Northeast Airport which has been designated for industrial development. It was first sold by the Philadelphia Redevelopment Authority to the Philadelphia Industrial Development Corp., which in turn sold it to Howard.

Fogel said the new plant will be equipped with recently developed equipment which will make it one of the most modern in the refrigeration industry. This will include electronically controlled automatic gun welders and electronic testing apparatus. The plant will have a railroad siding and tailgate-level truck loading docks.

Howard, which has been operating here since 1945, supplies refrigeration equipment throughout this country as well as Canada, the Near and Far East, Hawaii, and Caribbean areas. It also holds extended contracts with the United States Armed Forces for specialized sub-zero storage units.

In 1958, it acquired a controlling stock interest in the Clover Refrigerator Company, which now operates as an affiliated company and which will also be housed in the new plant. Howard's present Philadelphia plants are located at 4745 Worth St. and 1929 Huntingdon St.

Air Compressors Described In Booklet

»» RECIPROCATING carbon-ring air compressors for hospital and laboratory central systems, which deliver oil-free, low-temperature air at maximum volume per kilowatt hour, are described in a new booklet (NM-285.000) available from National Cylinder Gas Division of Chemetron Corporation.

Drawings and dimension tables give details of the horizontal A.S.M.E. receiver mounted unit, the base plate mounted unit, and vertical A.S.M.E. receivers. Duplexing of air compressors is discussed, and diagrams show three suggested arrangements.

Motors, switches, starters, transfer switches, and optional accessories including regulators, filters and dampeners are described.

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THE BEST OPERATION IN FROZEN FOODS

● Niagara "No Frost" lifts the penalty that icing puts on large operations in freezing foods or warehousing them. It gives you all the benefits of continuous production with FULLY automatic refrigeration and protects you from losses of valuable perishables by assuring you always full capacity from your refrigeration plant and your operation running smoothly when you need it most... during peak loads. You save labor and power and get lower cost figures both in operation and upkeep. You can get a plant design that is efficient.

Write for Bulletin No. 105

NIAGARA BLOWER COMPANY

Dept. IR-8, 405 Lexington Ave., New York 17, N. Y.

District Engineers in Principal Cities

Frick Company Appoints Ernst Kofod

››› THE appointment of Ernst K. Kofod as Southeast Asia regional manager for Frick Company has been announced by Joaquin Alvarez, sales manager, International Division of this manufacturing company.

E. K. Kofod

Mr. Kofod, who has been with Frick Company since 1951, formerly was assistant chief estimator in the company's refrigeration and air conditioning division.

Before joining Frick Company, Mr. Kofod served as chief refrigerating engineer for the East Asiatic Company, Ltd., Calcutta, India.

With the regional headquarters located at 25 Saiboo Street, Singapore, the Frick territory encompasses Malaya, Indonesia, Cambodia, Laos, South Vietnam, the Philippine Islands, British Borneo, Thailand and Hong Kong.

Mr. Kofod, a graduate of Kobenhavns Mastinteknikum, Denmark, will assume his new post this month.

Frick Company manufactures refrigeration, air conditioning, and sawmill equipment.

Cooling Towers Bulletin Available From Halstead & Mitchell

››› A NEW bulletin on its series of centrifugal fan cooling towers has been published by Halstead & Mitchell Co., Pittsburgh. Available in sizes from five to thirty tons capacity for either horizontal or vertical air flow, the centrifugal fan cooling towers are designed for indoor installations requiring long ductwork runs.

All models are designed to conserve up to 95 per cent of cooling water used in refrigeration, air conditioning, or process applications, thus meeting municipal regulations aimed at preventing the waste of cooling water.

Halstead & Mitchell cooling towers—both the horizontal air flow (ECKB Series) and the vertical air flow (ECKVB Series)—feature a 20-year guarantee against fungus or rotting on the pressure-creosoted wetted deck surface. All models are shipped with the cabinets completely bolted and sealed but they may be disassembled easily for installation in hard-to-get-at areas.

Bulletin ECKB-601 also contains charts showing operating and dimensional data as well as take-apart dimensional data. Copies may be obtained by writing to Halstead & Mitchell Co., Bessemer Building, Pittsburgh 22, Pennsylvania.

48 Recold Vapomatic Coils in Seafood Market

››› 117,150 cubic feet of refrigeration area in the Philadelphia Seafood Market maintain even freezing temperatures with 48 Recold Vapomatic Coils. This new home of the Philadelphia Sea Food Dealers Association is one of the finest new food distribution centers in the United States. Located on a 450 acre tract near the Walt Whitman bridge in South Philadelphia, the 650 foot long building houses 21 dealers, whose gross annual receipts total roughly $13 million.

Recold's low-temperature Vapomatic coils are used exclusively to maintain even, below-freezing temperatures in 23 unit stalls, each measuring 25 feet wide, 60 feet deep, and 18 feet high. Covered loading platforms give each stall a total depth of 100 feet. Also in the same seafood building are a restaurant, barber shop, and ice house.

Recold Vapomatic Coils provide fast, positive, automatic defrosting, utilizing the available heat of compression. The heat used for defrosting is instantly available and continues undiminished until the coil is completely defrosted.

The refrigeration for the Philadelphia seafood market was installed by Elliott-Lewis. The market was built by M & L Construction Company.

Podell Named Engineer For Hi-Press

››› JEROME Podell has been appointed Chief Engineer of HI-PRESS Air Conditioning of America, Inc. Formerly he was Chief Engineer with the firm of S. W. Brown, consulting engineers on air conditioning, heating, refrigeration and ventilation.

Mr. Podell participated in the design and installation of air conditioning and refrigeration systems on such vessels as the Moore-McCormack liners, Argentina and Brasil; the American Export Lines' Atlantic; and the French Line's new transatlantic superliner, France. He has handled numerous land-based projects, including major developments for the U. S. Air Force and the U. S. Army Corps of Engineers.

Before joining S. W. Brown in 1955, Mr. Podell served as applica-

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ICE MAKER for
QUALITY, LOW COST ICE

- Superior design; proven high performance. Low Power requirements
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- Models from two tons per day upward
- Use Freon or Ammonia

Mechanical Ice Handling Systems for "Push-Button" Ice Delivery

Engineering Representation Throughout the World
Write for Complete Information, Bulletin IR

North Star ICE EQUIPMENT COMPANY, INC.

tion and design engineer for Carrier Corporation. A graduate of the College of the City of New York with a degree in mechanical engineering, Mr. Podell is a member of the American Society of Heating, Refrigeration and Air Conditioning Engineers.

Swartz To Manage Training Program For York

››› DONALD H. Swartz has been named manager of marketing development by the York Division of Borg-Warner Corporation.

In his new position he will be responsible for the sales and management training programs in the marketing division, according to Austin Rising, vice president and director of marketing. An expanded program for training of all sales personnel, both in the field organization and among dealers and distributors, will be developed under Swartz' direction.

A native of York and a graduate of William Penn Senior High School, Swartz received his B.S. in Mechanical Engineering at Lehigh University in 1953, immediately prior to joining York Corporation as a graduate engineer trainee. His previous assignments have included field sales work, product development, and instructor in York's graduate engineer trainee program.

32-Page Brochure On Environmental Testing

››› THE latest data on environmental testing and other applications for controlled atmospheric conditions is the subject of new 32-page Brochure No. 600 offered by Webber Manufacturing Co., Inc., P. O. Box 217, Indianapolis 6, Ind.

An outstanding feature is a pictorial color chart summarizing latest known data at altitudes from sea level up to two million feet. It shows specific weight, pressure, acceleration of gravity, and molecular weight at the various altitudes. Other charts give technical information on atmosphere, temperature and humidity.

The brochure includes a review of the nine main environmental applications, and presents details on 13 types of Webber environmental chambers and low temperature freezers. These provide a temperature range from minus 225°F. to plus 1,000°F., and simulate various conditions of altitude and humidity.

In addition, the brochure includes data on temperature performance, specific heat of various substances, metal shrinkage, low temperature refrigerants, conversion fluids, temperature conversion, and temperature controls. Schematic diagrams and engineering data on Webber equipment are also given.

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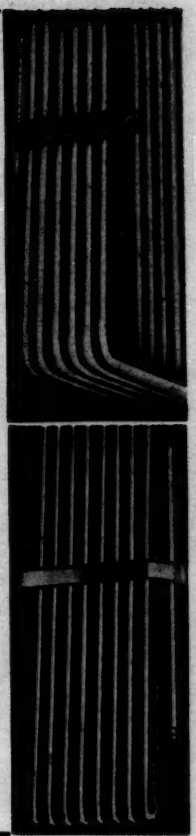

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Chicago 14

Classified Advertising

All classified advertisements are payable in advance. Except for Positions and Help Wanted classifications, this section is reserved exclusively for USED equipment.

RATES: 20c per word; minimum 25 words. $2.00 per line for bold face headings: $15.00 per inch for line listings.

Ice Plant For Sale

TO SETTLE ESTATE—A REAL "BUY"
1 story cement block building; excellent condition; 9000 square feet; 3 York compressors capable of 50 tons of refrigeration; two ice storage rooms; one hardening room. Ice contracts with Erie and B. and O. railroads and Alleghany State Park. $9000.00 gross sales in '59. Parking facilities. 3 rental spaces bring in $175.00 per month. Best offer over $15,000. Ned Fenton Jr., Real Estate Broker, 127 Main St., Salamanca, N. Y. Phone 59 or 1497.

USED EQUIPMENT—wanted & for sale

WANTED—Practically new 30 to 40 ton plant to be dismantled and moved. Prefer grid tank with 11" 300# cans. Write Box AU-3, c/o Industrial Refrigeration.

WANTED—one 4 cylinder 11½x10, or comparable size, ammonia compressor, direct connected to synchronous motor. Must be in first class condition. Address Box JL-2, c/o Industrial Refrigeration.

REFRIGERATION EQUIPMENT FOR SALE
Advise Us Your Needs
Use QUICKSEAL—stops brine tank leaks.
Use CLERTEMPICE—clears and tempers ice.
Born Company 80 East Jackson Boulevard.
Chicago 4, Illinois. WAbash 2-3299.

WANTED—Private party wants 50 to 100 ton evaporator condenser—late model—top condition, and ASME receiver. Write Box AU-2, c/o Industrial Refrigeration.

WANTED—USED EQUIPMENT

Interested in purchasing 150 ton capacity low temperature compressors, with motors and necessary starters. Write E. G. Reinsch, 2040 Columbia Pike, Arlington, Va., or telephone JAckson 8-3426.

FOR SALE
(2) 11x9 York compressors.
10x10 York V-belt drive.
9x9 & 5x5 York compressors.
(2) 60 h.p. G.E. motors 900 r.p.m. w/controls.
100 h.p. D.C. motor, 230 volts, w/controls.
JOHN F. CARSON
A & Venango Sts., Philadelphia 34, Pa.
GArfield 6-2221

FOR SALE—AMMONIA EQUIPMENT
1— 15 ton Frick ice making plant.
1— 10"x10" 4-cyl. Frick duplex D.C. to 225 h.p. motor.
1— 9"x9" 4-cyl. York duplex D.C. to 150 h.p. motor
3— 10"x10" 2-cyl. York D.C. to 100 h.p. motor
1— 9"x9" 2-cyl. York D.C. to 75 h.p. motor
2— 10"x10" 2-cyl. York with V type flywheel.
1— 9"x9" 2-cyl. York with V type flywheel.
2— 7½"x7½" & 8½"x8½" 2-cyl. Vilters
3"x3", 4"x4", 5"x5" & 6"x6" York and Frick compressors.
3"x3", 4"x4" & 5"x5" York condensing units.
6— York floor type blower unit coolers.
1— Niagara floor type blower brine spray.
11"x22"x47" 300-lb. ice cans.
75, 100, 150-ton ice making plants.
6— shell & tube condensers, 25-ton capacity.
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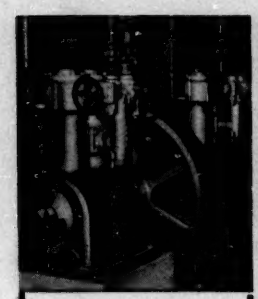

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For every size load and application—5 to 150 tons

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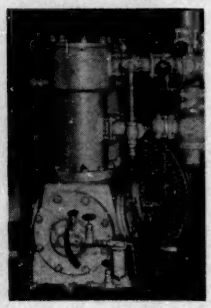
VERSATILE AS INDUSTRY ITSELF!



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For low temperature service

HOWE 3-Fan UNIT COOLERS
For heavy duty, high tonnage blast freezing, freezer storage

HOWE Polar Circle COILS
For freezer storage as well as normal temp work

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Throughout industry you'll find the versatility of HOWE refrigeration equipment doing a more efficient, more economical job. In meat packing, dairy product and ice making plants, warehouse storage, food processing and food freezing plants, and many others, HOWE Compressors and Components are doing may jobs with year-after-year dependability. Whatever your special needs—cooling, chilling, freezing, holding—there's a HOWE-engineered system to meet them.

For highest "Degree-Dollar" refrigeration efficiency at the lowest possible cost, consult HOWE today. More than 48 years of specialized experience backs our recommendations.

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Since 1912, manufacturers of compressors, condensers, accumulators, unit coolers, surge drums, vessels, fin and pipe coils, flake ice makers, receivers, etc.

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Liquid Ammonia Recirculating and Return systems

Some confusion exists among refrigeration users over popular references to "liquid recirculation" and "liquid return." This 32 page reprint from INDUSTRIAL REFRIGERATION, as well as being informative with regard to economic application in modern industrial refrigeration plants, should help clarify the use of each method and system.

Available at 50 cents per copy from

Industrial Refrigeration
433 N. Waller Ave., Chicago 44, Ill.

"Zephyr"-25 "Zephyr"-50

New "Zephyr" containers for "Freon" —lighter in weight, easier to handle

These new "Zephyr" containers for "Freon" refrigerants are shorter, wider, lighter—so much easier to handle that a 50-lb. size is now practical. You can use them upright or inverted without special blocks or stands . . . stack them one on top of the other . . . stand them upright in your truck.

A permanent collar not only protects the valve, but also serves as a built-in carrying handle. And no wrenches are needed, because these new containers also have a new-type handwheel valve. Both "Freon-12" and "Freon-22", the premium-quality refrigerants, are available in these new Du Pont "Zephyr" containers.

New top and valve for standard 25-lb. cylinders

Now, Du Pont's new "Spintop", for standard 25-lb. cylinders, combines a convenient carrying handle, valve protector and stand, all in one. Free to rotate, the "Spintop" provides easy access to the valve. And the valve itself is a handwheel type that includes a special, spring-loaded pressure relief valve for added safety.

Complete family of containers* for "Freon" refrigerants includes the new "Zephyr" types; standard 10, 25 and 145-lb. containers; and the new "Spintop" cylinder. Your *leading* air-conditioning and refrigeration wholesaler stocks the type that suits your needs best. Call him today for your order of "Freon" refrigerants.

**1- or 2-lb. "Can-O-Gas" containers of "Freon" refrigerants are available from the Virginia Smelting Co., our nationwide sales agent and authorized repackager.*

FREON®

premium quality

refrigerants

DU PONT

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

Meet the New Uniform Codes for 0°F Temperature with Vap-r-tyt® Freezer Doors

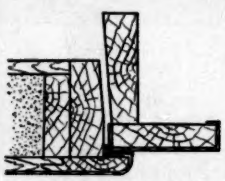
VAP-R-TYT METAL CLADDING

All metal seams locked and soldered

Penetrating bolt holes sealed

Prevents penetration of moisture under high vapor pressure

INFITTING DESIGN

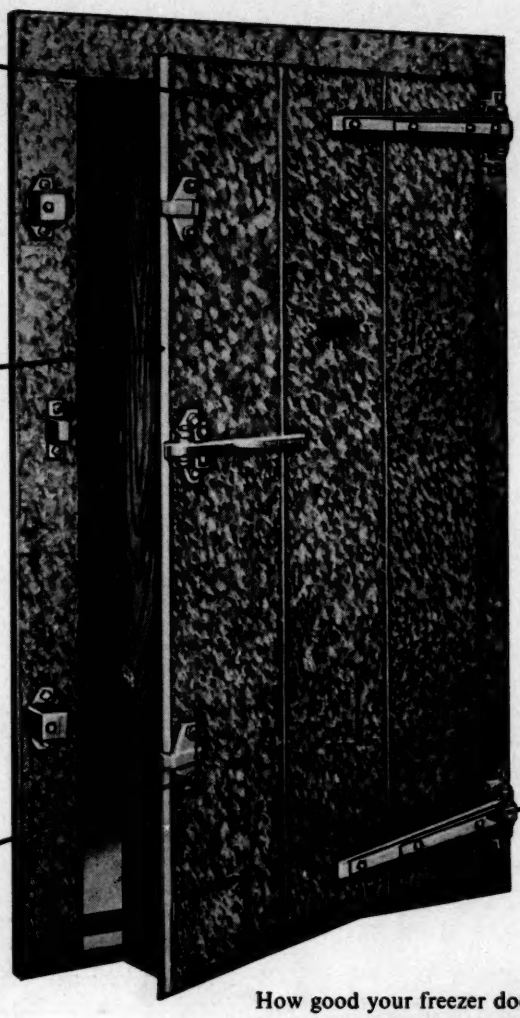


Requires less space than overlap type

Fits *into* wall

Requires shorter radius of swing

E-Z OPEN TWO-POINT FASTENER



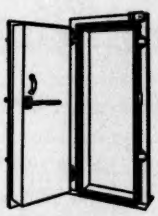
JAMISON FROSTOP® (optional)

Keeps doors from freezing shut

Safe temperature range eliminates dangers of overheating or condensation

Permits selection of any temperature between 60°F and 120°F

Carries Underwriters' Laboratories Inc. label



ADJUSTOFLEX HINGE

How good your freezer door performs depends on its basic design and construction. Jamison Lo-Temp Vap-r-tyt doors—proven through years of service in all types of installations—are today's economical answer to modern freezer operation. Write today for catalog Section 4 to Jamison Cold Storage Door Co., Hagerstown, Md.

JAMISON

COLD STORAGE DOORS